CALTRAIN FARE STUDY

Phase 1 Report

Public Review Draft

AUGUST 2, 2018

Caltrain®

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1 Executive Summary

The following report presents the findings from Phase 1 of the Caltrain Fare Study. It was produced by the Peninsula Corridor Joint Powers Board (JPB), the entity that oversees Caltrain commuter rail service. The agency last completed a comprehensive Fare Study in 2001, and much has changed since then for Caltrain and the region. Updated data and analysis are needed to understand how potential fare changes could affect ridership, revenue, and equity for Caltrain. The study is being conducted in phases, with the first phase of work presented in this report focused on understanding existing conditions and the price elasticity of demand for Caltrain. Phase 1 of the Fare Study was conducted between spring of 2017 and spring of 2018. It is anticipated that the findings from the Fare Study will serve staff, members of the JPB and the Caltrain Citizens Advisory Committee (CAC), and members of the public.

This Executive Summary provides an overview of this report. It includes key highlights from each chapter of the report, including the Purpose and Need, Existing Conditions, Peer agency Fare Comparison, Goals and Performance Metrics, and Caltrain Fare Elasticity. Then, it presents key policy questions that arise from the Phase 1 findings, followed by recommendations for the agency and suggestions for Phase 2 of the Fare Study.

1.1 Purpose and Need for the Caltrain Fare Study

Chapter 2 presents the purpose and need for the Caltrain Fare Study, which is summarized here. The fare products currently offered by Caltrain were developed at a time when attracting ridership was a primary goal of the agency. Caltrain does not currently have a Board-adopted fare policy, and it has not established formal goals and principles to guide its price-related decision-making. Historically, Caltrain has had a practice of increasing its fares about every two years with limited in-depth analysis on the relationship between ridership and fare elasticities; additionally, many of these fare changes were adopted in response to forecasted budget shortfalls. Meanwhile, ridership and resulting fare revenue have continued to grow, more than doubling since 2005. In light of all this, the agency has sought to conduct a study that will support well-informed decisions regarding fares and fare products and help shape policy that better suits the needs of the agency. The objectives for the Fare Study include:

- Identify potential opportunities to maximize revenue,
- Enhance ridership, and
- Safeguard social and geographic equity.

The purpose of the first phase of work has been to provide data and analysis to better understand Caltrain's current fare products, compare Caltrain fares to peer agencies fares, and analyze how fare changes could impact ridership, revenue, and equity for Caltrain. Throughout the process of Phase 1, JPB staff has presented updates to the CAC and JPB to provide information and solicit feedback on the technical analysis and findings.

1.2 Existing Conditions

Chapter 3 presents a detailed report on existing conditions to provide an updated, foundational understanding of Caltrain's fares and ridership today. Some of the key findings from this research are described below.

Fare Product Usage

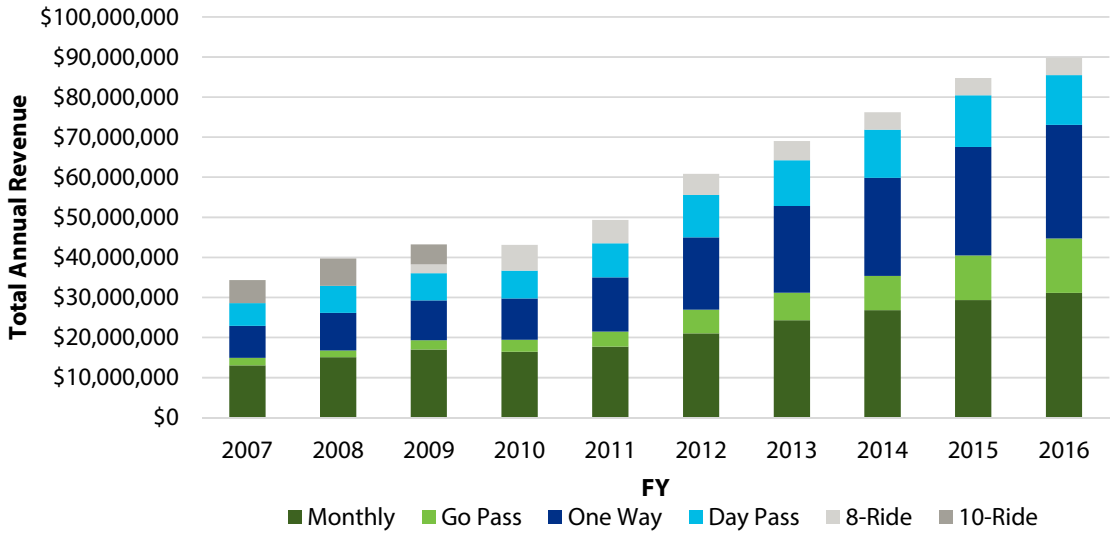
Caltrain's fare products are used with varying degrees of frequency by riders, according to Caltrain's 2016 Triennial Survey. Monthly passes purchased on Clipper Cards were the most common fare product used by surveyed riders, with Go Passes the second most common, together accounting for 56 percent of Caltrain riders.

Fare Revenue

Over the past ten years, Caltrain ridership has grown dramatically, from about 25,000 weekday riders in 2005 to about 64,000 weekday riders in 2018, which has increased the total fare revenue for the agency. Figure 1 shows this growth in total annual farebox revenue by fare product over the last ten years. In 2016, 34 percent of fare revenue was from monthly pass purchases, and 30 percent was from one-way ticket purchases, comprising the two largest sales categories and more than half of the annual fare revenue. Go Pass accounted for about 15 percent of the total fare revenue in 2016.

Analysis in Chapter 3 also demonstrates that there are large differences between the revenue earned per passenger and per passenger mile for each fare product. For fully priced products in the month of October 2016, the analysis shows that revenue per passenger and the revenue per passenger mile were highest for one-way passes purchased on ticket vending machines (TVM) and day passes, while they were lowest for Go Pass.

Figure 1: Total Annual Farebox Revenue by Fare Product, 2007 - 2016



Note: One-way includes both Clipper one-way fare and paper tickets.
Source: Caltrain JPB Revenue, 2007 – 2016.

Farebox Recovery Ratio

Today, Caltrain has one of the highest farebox recovery ratios in the country. Over the last ten years, Caltrain ridership has grown substantially, which has increased the total fare revenue brought in for the agency. During the same period, Caltrain service has not changed substantially, and operational costs have largely remained stable. As a result of this revenue growth and stable operating costs, Caltrain's farebox recovery ratio has increased over the last decade and is currently estimated to be about 70 percent.

Rider Demographics

Similar to other commuter rail lines in the country, Caltrain's ridership is predominantly composed of individuals with higher annual household incomes. According to the 2016 Triennial Survey, only 16 percent of Caltrain passengers' households earned less than $50,000 per year; 24 percent earned between $50,000 and $100,000; 22 percent earned between $100,000 and $150,000; 15 percent earn between $150,000 and $200,000; and 23 percent earned over $200,000. Since 2010, the percentage of Caltrain riders in the lowest income brackets has decreased, while the percentage of riders in the highest income brackets has increased.

With regards to race and ethnicity, three-quarters of Caltrain riders identified as white or Asian, according to the 2016 Triennial Survey. Additionally, since 2010, the percentage of white passengers has decreased, replaced primarily by growth in the percentage of Asian passengers. Other race and ethnicity groups did not change substantially over this period.

The type of fare product used by riders varies somewhat by annual household income, according to the 2016 Triennial Survey. Compared to all riders, lower income riders were more likely to use a single-fare product and less likely to have a monthly pass or Go Pass, regardless of how often they ride Caltrain. Lower income riders were also less likely to use a Clipper card. As annual household income increased, usage of high-value products like the monthly pass or Go Pass generally increased. Above annual household incomes of $50,000, there was little variation in the distribution of fare product usage across the income groups. A lower proportion of Go Pass users compared with all Caltrain riders had incomes under $50,000 per year.

1.3 Peer Agency Fare Comparison

Chapter 4 presents a peer agency fare comparison to better understand how Caltrain's fares relate to its other transit and commuter rail agencies nationally, and some of the highlights are described below. The comparison included a study of 19 different transit and commuter rail agencies, including Caltrain.

Caltrain's fares were found to be about average compared to peer agencies. A majority of the peer systems studied use a zone-based fare structure. Caltrain was found to have the highest farebox recovery ratio of all the commuter rail systems studied. This is attributed to the recent growth in ridership and revenue while service and costs have remained relatively flat. The research also revealed that peak/off peak fares are not common in the United States. Means-based fare programs are growing on the West Coast, and transit agencies partner with external agencies to do the means-testing. Peer systems' reported price elasticities ranged from -0.13 to -0.22. Peer agency staff strongly endorsed

frequent, planned, and predictable fare changes, improve budgeting and planning processes; reduce pressure on the Board; and help manage fare expectations with the public.

1.4 Goals and Performance Measures

To address the primary objectives for the Caltrain Fare Study, a set of performance goals and metrics have been developed and are presented in Table 1 below, with additional details in Chapter 5. These goals and performance measures have been identified and discussed with the Caltrain Board of Directors in relation to potential fare changes, but not adopted as official policy.

Table 1: Goals and Performance Metrics

Goal	Metrics
Enhance Ridership	- Average weekday ridership - Total annual ridership
Increase Operating Revenue	- Total annual revenue - Total annual revenue per passenger
Safeguard Social and Geographic Equity	- Percentage of low income riders projected vs. percentage of low income riders in Caltrain-serving counties - Caltrain's average fare per track mile vs. other transit agencies' average fare per track mile

1.5 Caltrain Fare Elasticity

When the previous Caltrain Fare Study was conducted back in 2001, the results indicated that Caltrain's ridership demand was elastic, or highly influenced by price, and any fare increase was expected to result in ridership decline. Since then, Caltrain introduced Baby Bullet express train service resulting in substantial growth in ridership, so one key objective for the Caltrain Fare Study was to determine the price elasticity of demand for Caltrain's current ridership. Chapter 6 presents the detailed results of this important analysis, and highlights are presented below.

Using data from an extensive rider survey, a Fare Elasticity Simulator was built by the consultant team for Caltrain. This is an important tool can be used to test potential fare changes to existing, regular fare products and to analyze potential ridership, revenue, and equity outcomes. This tool allows more in-depth technical analysis around fare pricing.

In addition to allowing staff to test potential fare changes, the Fare Elasticity Simulator also allowed the agency to determine that the current price elasticity of demand for Caltrain is inelastic. This means that current passengers are not likely to drastically change their demand, or use, for Caltrain service based on fare changes. The price elasticity of demand for the overall system was estimated to be -0.2, which means that with a price increase of 10 percent, Caltrain could expect to lose about 2 percent of its ridership. Generally, raising fares are expected to lead to substantial increases in revenue for the agency, with minor ridership declines among existing riders and very slight declines for social and geographic equity indicators.

Caltrain's higher income passengers were found to have more elastic demand compared to lower income passengers. In other words, Caltrain's higher income passengers are generally more price

sensitive regarding Caltrain fares than lower income passengers. This means that increased Caltrain fare prices are more likely to be absorbed by passengers with the least means to pay for higher fares.

1.6 Policy Considerations from Phase 1 of the Fare Study

The findings from Phase 1 of the Fare Study lead to important policy questions for the agency, which are described below.

- First, the existing conditions research and analysis on Caltrain's fare revenue, rider demographics, and fare product usage patterns indicates that there is an equity question with Caltrain's current fare products and pricing. Specifically, there are large differences between the fare products regarding how much revenue they earn per passenger and per passenger mile, and there are also differences regarding which fare products are more likely to be used by passengers in different income groups. Revenue per passenger and revenue per passenger mile are highest for one-way TVM and day pass products, two products that data shows are more likely to be used by lower income riders. In contrast, revenue per passenger and revenue per passenger mile are lowest for Go Pass, which data shows is more likely to be used by higher income riders. Ultimately, this means that Caltrain derives more revenue per passenger and per passenger mile from products that are most likely to be used by lower income riders, while its higher income riders are more likely to use products that earn Caltrain less revenue per passenger and per passenger mile. Recognizing that equity is one of many policy priorities the agency must consider, should the agency strive for greater equity outcomes in its fare-related decisions? What strategies could be deployed to effectively balance equity within Caltrain's current fare products, pricing, and programs?

- Second, based on the findings from the Fare Elasticity Simulator, additional policy questions for Caltrain arise. Because the Fare Elasticity Simulator shows that Caltrain can raise its prices to gain substantial revenue returns without losing large portions of its current ridership, one could easily conclude that the agency could solve fiscal difficulties by maximizing its fare prices and increasing total annual farebox revenue. As a public transportation provider without a permanent dedicated source of funding, this could be a viable option for Caltrain, especially in the face of potential budget deficits. At the same time, Caltrain provides a critical transportation service for the public in three counties in the Bay Area, so the agency must consider the current ridership's inelastic demand for Caltrain service from another angle: how much revenue *should* Caltrain generate from the riding public? Is it fair to continue increasing Caltrain fares at a time when many current passengers are willing to pay higher fares? What are the broader implications, for the agency and for the public, of fare increases? How can the agency balance tradeoffs between the three Fare Study goals of increasing revenue, enhancing ridership, and safeguarding social and geographic equity?

- The third policy question builds on findings from both the existing conditions research and the Fare Elasticity Simulator results. As described above, there are discrepancies in the fare product usage patterns among different rider income groups, with Caltrain's lower income riders more likely to use fare products that are priced the highest and earn the most revenue

per passenger and per passenger mile for the agency. At the same time, the Fare Elasticity Simulator results showed that these same lower income riders have low demand inelasticity, meaning that they are more likely to absorb price increases so they can continue riding Caltrain. This raises concerns related to the Fare Study's goal of safeguarding social equity. It leads to another policy question: how much revenue the agency should be generating for its fares, and from which fares?

1.7 Key Recommendations and Next Steps

Building on the research and analysis from the Phase 1 tasks and the resulting policy questions, Chapter 7 presents key recommendations from Phase 1 of the Fare Study and suggests next steps for Phase 2 of the Fare Study. A summary of the chapter is presented below.

Key Recommendations

- **Balance Goals for Revenue, Ridership, and Equity.** The findings from Phase 1 of the Fare Study illuminate the challenge and difficulty of achieving all three of those goals simultaneously. In addition, Phase 1 results indicated that Caltrain's current ridership has low price elasticity of demand for the commuter rail service, but this result must be weighed carefully in light of equity goals. In other words, just because the agency *can* increase fares does not mean it *should* do so. Instead, the agency should consider and weigh the broader picture of revenue, ridership, and equity impacts and tradeoffs of potential fare changes before adopting and implementing them, striving to balance gains towards all three of the goals.

- **Adopt a Formal Foundational Fare Policy.** The results from Phase 1 suggest that the agency would benefit from a Board-adopted fare policy to establish principles and goals that would underlie and guide the agency's pricing-related decisions. The policy would allow the agency to prioritize the relative importance of the goals from the Fare Study, including enhancing ridership, increasing revenue, and safeguarding social and geographic equity; this would aid staff and the Board by guiding decision-making regarding potential fare changes. The policy could also evaluate and guide the process for changing fares, potentially including the frequency of fare increases.

- **Seek Opportunities to Address Current Fare Equity Question.** Another key finding from Phase 1 of the Fare Study is that there is currently a question about equity in the agency's fare system, and it is recommended that the JPB consider opportunities to address this. Potential options could include changing the pricing of current products to ensure that products that are more likely to be used by higher income riders contribute more revenue to the farebox. Another option to consider is participation in the regional means-based fare program that is currently being developed by the Metropolitan Transportation Commission and regional transit operators, to provide a fare discount to qualified low income individuals at participating transit agencies.

- **Use Fare Elasticity Simulator to Analyze Potential Fare Changes.** The Fare Elasticity Simulator provides the agency with an important tool to help analyze impacts of potential fare changes. It is recommended that the agency use the Fare Elasticity Simulator when considering potential future fare changes to existing, regular fare products, so that it can be better informed regarding potential impacts to ridership, revenue, and equity. In particular, because Caltrain's current ridership demand is inelastic, the raising of fare prices is expected to generally lead to an increase in fare revenue for the agency. At the same time, increased fares are also expected to have some negative ridership and equity impacts; in general, these are not forecasted to be large but nonetheless should be considered as potential adverse impacts. Incorporating the use of the Fare Elasticity Simulator into the agency's process for considering potential fare changes can help the agency weigh tradeoffs and potential impacts, ultimately leading to more informed decision-making regarding fare changes.

- **Delay Implementation of Off-Peak Fare Discount.** It is recommended that the agency defer pursuing an off-peak fare discount at this time. Offering an off-peak discount may increase off-peak trips on the Caltrain system, especially among lower income passengers, but it is expected to do relatively little to reduce peak period trips and alleviate current capacity issues on board during the peak period. An off-peak discount is expected to result in lower revenue earnings, an implication that should be carefully considered, as well. Rather, this option is suggested to be examined only after the agency is able to examine more off-peak train service.

Near-term Next Steps

Building on the key recommendations discussed above, the following tasks are proposed for Caltrain to pursue in the near term.

1. Conduct Phase 2 of the Fare Study, which should include the following tasks.

    a. Develop and adopt a formal fare policy for Caltrain to establish the principles, goals, and procedures that will underlie and guide the agency's pricing-related decisions. This task should include research into how other agencies set or change fare policy. Then, building on those best practices, a draft policy should be crafted and eventually adopted by the Caltrain Board of Directors.

    b. Conduct a detailed study of Caltrain's deep discount program, Go Pass, to better understand the program and inform potential changes to the program in the near future. While Phase 1 included some initial findings related to Go Pass, including some of its benefits for the agency, additional analysis is needed to fully understand the costs and benefits of the program for the agency, as well as to inform potential changes to the program, including its structure, pricing, requirements, and administration.

    c. Conduct a Parking Study to inform potential changes to Caltrain's parking program in the near future. Similar to the Go Pass program, Phase 1 of the Fare Study presented some initial findings related to the agency's parking program, but a broader

study of its parking program is needed. It is recommended that this task explore parking strategies and pricing scenarios for Caltrain's parking program, such as demand-based pricing.

2. Continue participating in development of the regional means-based fare program with MTC and other transit operators. It is strongly recommended that the agency continue to consider participating in the potential regional means-based fare program. JPB staff should continue to participate in the regional conversations with MTC and other operators, while also analyzing tradeoffs for Caltrain's potential participation, including financial, administrative, and equity considerations. Staff should return to the Caltrain Board of Directors with additional information when the program is further along in development to discuss the agency's potential participation. If the Board agrees to participate in the program, the discount fare program must be formally adopted and implemented as a fare change to Caltrain's fare system, including Title VI analysis and public outreach processes.

Longer-term Next Steps

A long-term, comprehensive plan for Caltrain is currently under development with the Caltrain Business Plan initiative, and other planning studies are being coordinated with the scope of that effort. It is recommended that several longer-term issues related to fares and fare policy be advanced within the context of the Caltrain Business Plan. This includes studying Caltrain's current zone-based fare structure in contrast to a station-to-station structure; innovative fare products and pricing, such as the off-peak discount; integration with regional and statewide ticketing innovations; and technological improvements to fares (advanced mobile ticketing, integrated ticketing with parking and access programs, etc.). These are farther-reaching policy considerations that must be aligned with the scope and outcomes of the Caltrain Business Plan, so at this time, it is recommended that the agency deferring these items to a later time.

2 Purpose and Need for Caltrain Fare Study

2.1 Introduction

This chapter provides background on Caltrain and its current fare structure, as well as the purpose and need for the Caltrain Fare Study.

2.2 Background

Caltrain Service

Caltrain is administered by the San Mateo County Transit District and is governed by the Peninsula Corridor Joint Powers Board (JPB), a 9-member appointed body representing the railroad's service area in San Francisco, San Mateo, and Santa Clara counties.

Caltrain operates commuter rail service along a 77-mile long corridor on the San Francisco Peninsula serving 32 stations in 19 communities from San Francisco to Gilroy. Caltrain currently operates 92 weekday, 36 Saturday, and 32 Sunday trains. Service is a mix of local, limited, and "Baby Bullet" express trains. The Baby Bullet service travels between San Francisco and San Jose in less than one hour with limited stops. Local service trains stop at all stations. Most stations are served by limited trains, which offer faster travel times. On weekends, Caltrain runs local trains serving all stations with 4 Baby Bullet trains also integrated into the schedule.

Caltrain has experienced rapid ridership growth in recent years. In February 2017, Caltrain's average weekday ridership was over 62,000. Since 1997, ridership has more than doubled. Unlike systems in other parts of the country, Caltrain's commute is fairly balanced with about 60 percent of morning commuters heading north towards San Francisco and about 40 percent of commuters heading south towards San Jose. Many trains reach capacity during peak commute hours, with the highest demand for space on the fastest trains.

Caltrain is in the process of implementing the Peninsula Corridor Electrification Program (PCEP). The project includes the installation of an Overhead Contact System (OCS) along the rail system beginning at the 4th and King Caltrain Station in San Francisco and ending at Tamien Station in San Jose. The project also includes the design and procurement of up to 96 new Electric Multiple Units (EMU) trains to replace approximately 75 percent of the existing, in-service, diesel rolling stock. These new EMUs will be able to accelerate and decelerate faster than diesel trains, providing the flexibility to increase the frequency of service without adding travel time and/or reduce the overall travel time from one end of the corridor to the other. This important improvement allows for increased capacity on the corridor and makes it possible for Caltrain to serve more customers at more stations. The PCEP has a target in-service date of FY2022.

Fare Background

The fare products currently offered by Caltrain were developed at a time when attracting ridership was a primary goal of the agency. A deeply discounted fare was offered through the Go Pass Program, introduced in 2005 to allow employers to buy annual passes in bulk at a greatly reduced price for their employees, to encourage workers to choose Caltrain for their commutes.

Historically, Caltrain has increased its fares at a fixed percentage every few years without an in-depth analysis of fare elasticities and how different products and pricing could impact ridership. The agency seeks a thoughtful study that will support well-informed decisions regarding fares and fare products and help shape policy that better suits the needs of the agency.

Fare changes that have been adopted and implemented in recent years are summarized here:

- January 2011: Zone fare increased from $1.75 to $2.00. Go Pass increased from $140 to $155.
- July 2011: Base fare increased from $2.50 to $2.75.
- July 2012: Base fare increased for paper tickets from station ticket machines $0.25 for one-way and $0.50 for day pass (Clipper card price remains at $2.75 base); 8-ride ticket discount lowered from 15% to 7.5% and the validity period shortened from 60 days to 30 days; Go Pass increased from $155 to $165.
- January 2014: Implemented Group Travel Program allowing 10% discount off the paper ticket price for groups of 25 or more pre-purchasing tickets through program; Go Pass program expanded to allow option for less than full-time employees and interns; Go Pass program expanded to include residential complexes.
- October 2014: Base fare increased for paper tickets from station ticket machines an additional $0.25 for one-way and $0.50 for day pass (Clipper card price remains at $2.75 base); Go Pass increase from $165 to $180, with minimum participation rate of $15,120.
- December 2014: Youth age expanded from 17 years to 18 years.
- January 2016: Go Pass increase from $180 to $190, with minimum participation rate of $15,960.
- February 2016: Adult base fare increased by $0.50. As a result, this increased the amount paid for the day pass, 8-ride tickets and monthly passes.
- July 2016: Daily parking fees increase from $5 to $5.50, and monthly parking fees increase from $50 to $55.
- October 2017: Adult zone fare increase from $2 to $2.25; monthly pass multiplier increase from 26.5 to 28 one-way fares; monthly parking multiplier increase from 10 to 15 daily parking rates; 8-ride ticket eliminated.
- January 2018: Go Pass increase from $190 to $237.50 per eligible user, with minimum participation rate of $19,950.
- July 2018: Monthly pass multiplier increase from 28 to 30 one-way fares.
- January 2019: Go Pass increase from $237.50 to $285 per eligible user, with minimum participation rate of $23,940.

The last system-wide Caltrain fare study was conducted in 2001, when fare elasticity was determined to represent a significant deterrent to fare increases. The elasticity measured at that time indicated that ridership was very influenced by price, resulting in a high anticipated elasticity (meaning that any fare increase would be expected to generate a significant ridership decline). Since 2001, however, on-board surveys of Caltrain customers reveal that many riders along the corridor have high relative incomes and may not be as price sensitive as riders during the early 2000s. Additionally, Caltrain ridership has continued to climb rapidly, signaling that there may be missed opportunities to increase farebox revenue and improve farebox recovery ratios.

The lack of a dedicated funding source for Caltrain operations presents an ongoing challenge for the agency, especially since all three funding partners have their own transit systems to fund and operate. Caltrain depends on its fare revenue to cover almost 70 percent of its operating costs, which makes the "right-sizing" of the fare structure even more critical. To plan effectively for any long range service changes and expansions, Caltrain needs to have the technical analysis and policy framework in place to equitably maximize farebox revenues.

2.3 Purpose and Need

The purpose of the Fare Study is to provide updated data and analysis to inform and support the development of a fare policy at Caltrain. The primary objectives of the study are to:

- Identify potential opportunities to maximize revenue;
- Enhance ridership, and
- Safeguard social and geographic equity.

Caltrain is interested in exploring possible price changes to the existing fare products, including deep discount pass programs (Go Pass); peak and off-peak pricing; and options to introduce more equity into the fare system. This Fare Study will comprise a technical investigation to provide data and analysis to understand how these potential changes could impact ridership, revenue, and equity for Caltrain.

In support of the objectives stated above, the Fare Study seeks to provide recommendations that will accomplish the following:

- Optimize fare revenue to cover as much of the annual operating costs as possible;
- Address equity concerns related to Caltrain's high-income rider demographic and making the service more financially accessible for all customers, including those with lower incomes;
- Alleviate overcrowding on trains during peak periods;
- Be implemented, perhaps in phases, in the near- and mid-term; and
- Provide a basis for fare policy that will be relevant and address the needs of the agency for the next 10 years.

Anticipated to be a multi-phase study, the first phase of work on the Fare Study began in spring 2017. The purpose of the first phase of work has been to provide data and analysis to better understand Caltrain's current fare products, compare Caltrain fares to peer agencies fares, and analyze how fare changes could impact ridership, revenue, and equity for Caltrain. Throughout the process of Phase 1, JPB staff presented updates to the CAC and JPB to provide information and solicit feedback on the technical analysis and findings. Future phases of work on the Fare Study are expected to include additional technical analysis and development of a fare policy for the agency.

2.4 Related Studies

There is a direct and complementary relationship between the Fare Study and a number of Caltrain plans and ongoing planning efforts.

The Caltrain Fare Study will be consistent with the principles and objectives of the Caltrain FY2015-2024 Strategic Plan. The Caltrain Strategic Plan includes an objective to establish financial stability, minimize the operating subsidy and fund system improvements. Further, the Strategic Plan includes goals and objectives to maximize revenues by developing strategies to increase returns from existing revenue streams including fares, as well as to explore new funding streams. The Caltrain Strategic Plan also includes a goal conduct business in a socially responsible way, including providing an inclusive and equitable system.

The Fare Study will be coordinated with the ongoing effort to develop the Caltrain Business Plan. The Business Plan is intended to be an implementing document for the Caltrain Strategic Plan that builds upon and beyond the fiscally constrained capital and operating plans included in Caltrain's existing financial projections. The purpose of the Business Plan is to help Caltrain to achieve financial stability by aligning the railroad's costs and service delivery with available revenue and funding streams. It is anticipated that the Fare Study, not the Business Plan, will be the venue for detailed discussion about Caltrain's fare structure and policies – particularly in the near term. The Business Plan will coordinate closely with the Fare Study, incorporating research and analysis from this effort along with any fare-related policy direction provided by the Board.

The Fare Study will also be coordinated with other related planning studies, including the Caltrain Station Management Toolbox, which commenced in December 2016, and the Rail Corridor Use Policy, which commenced in spring 2017. The Caltrain Station Management Toolbox will serve as a decision support framework to facilitate the collaborative planning and execution of Transit Oriented Development (TOD) and multi-modal access improvements at and around Caltrain stations. The Toolbox will facilitate decisions about how limited station space should be allocated and how scarce funding can be leveraged and prioritized to improve the overall benefit to both Caltrain and the communities it serves. Closely related to the Station Management Toolbox, the project to establish a Rail Corridor Use Policy commenced in early 2017. This project will develop policy framework around the use of JPB-owned property along the rail corridor, and it will provide a decision framework related to permitted near- and long-term uses and associated procedures. It will also evaluate financial and operational tradeoffs associated with different uses of JPB property.

3 Existing Conditions

3.1 Introduction

This chapter describes the existing fares, ridership, and revenue on Caltrain for the Caltrain Fare Study. The report draws on multiple information sources to identify patterns over time and make cross-comparisons of existing data. All of Caltrain's fare products and riders are included in the analysis, with an emphasis on the Go Pass program for large employers.

The first section of the report provides a brief description of Caltrain service and describes the available fare products, including a description of the Go Pass program, and the usage of each fare product over time. The second section summarizes Caltrain's fare revenue and farebox recovery. The third section examines ridership and rider demographics, including selected results from the Caltrain Triennial Survey. The final section briefly describes parking usage and revenue for Caltrain parking facilities.

This research was completed in spring and summer 2017 using data that was available at that time (primarily from 2016 and earlier). As such, it includes findings related to products and pricing that are current up to September 2017. Since then, a number of fare changes have since been implemented (beginning in October 2017), including elimination of the 8-ride ticket, which are not accounted for in this chapter.

Existing Conditions Highlights

- Over the last ten years, Caltrain ridership has grown tremendously, which has increased the total fare revenue for the agency.
- There are large differences between the revenue earned per passenger and per passenger mile for each fare product.
- Revenue per passenger and per passenger mile is highest for one-way and day pass products and lowest for Go Pass.
- There are also large differences between the fare products that are typically used by riders in different income groups.
- As annual household income increases, usage of high-value products like monthly pass or Go Pass increases. One-way and day passes are more commonly used by lower income riders; they are also less likely to have a monthly pass or Go Pass.
- These findings mean that Caltrain derives more revenue from products that are most likely to be used by lower income riders, while its higher income riders are more likely to use products that earn Caltrain less revenue.
- This leads to a policy question: is it important for Caltrain to strive for greater equity in its fare products and pricing?

3.2 Caltrain Service

Caltrain is a commuter rail service on the San Francisco Peninsula, extending from San Francisco in the north through San Jose to Gilroy in the south. Service between Tamien and Gilroy is only available on weekdays, northbound during the morning peak and southbound during the evening peak. A map of all stations in the system is shown in Figure 2.

Peak trains are those trains departing the San Francisco or San Jose Diridon stations from 4:30 a.m. to 9:00 a.m. and between 2:59 p.m. and 7:00 p.m. There are three types of train service: Baby Bullet, Limited, and Local. The Baby Bullet service is an express train service that operates in both the northbound and southbound directions during the peak hours, stopping at only a few stations to minimize travel time. Two Baby Bullet trains are offered per hour in each direction in the peak periods. The Limited service trains stop at fewer stations than the local trains, but significantly more stations than the Baby Bullet service. Three Limited trains run per hour in each direction during the

peak periods, supplementing the Baby Bullet service. For both the Limited and Baby Bullet services, alternating trains visit a different set of stations to ensure all stations are served during the peak period. Local trains serve all stations, and operate once per hour during the off-peak periods. On weekends, Caltrain operates local service every 90 minutes with two Baby bullet trains in each direction, one mid-day and one evening train.

Annual Operating Cost of Caltrain Service

While this chapter focuses on existing conditions regarding Caltrain's fares, information about the annual operating cost of Caltrain provides helpful context and background for understanding the agency's fares, ridership, and revenue. The annual cost to operate Caltrain service is reported in the federal government's National Transit Database (NTD) each year and is shown in the table below. Costs have gradually increased from about $87 million in 2009 to about $116 million in 2016. Ridership has also grown during the same period, as reported by Caltrain's fare-media sales based ridership model. Since 2011, the annual operating cost per rider has gradually decreased; as of 2016, it was about $6 per rider.

Table 2: Annual Operating Cost Per Rider

Year	Annual Operating Cost	Annual Ridership	Annual Operating Cost Per Rider
2009	$87,035,619	12,691,612	$6.86
2010	$85,346,367	11,967,716	$7.13
2011	$92,227,280	12,673,420	$7.28
2012	$97,655,152	14,134,118	$6.91
2013	$101,991,916	15,595,559	$6.54
2014	$109,319,956	17,029,447	$6.42
2015	$115,403,592	18,567,173	$6.22
2016	$116,321,647	19,233,427	$6.05

Source: National Transit Database, 2018; Caltrain Fare Media Sales Based Ridership, 2016.

3.3 Fares and Fare Products

Caltrain uses a zone-based fare system which charges riders based on the number of zones they will be traveling through. Figure 2 shows the zone map for the Caltrain system. Fares generally are priced with a base fare that allows travel within a single zone, and an increment for each additional zone traveled through. The precise zone in which a passenger begins or ends their trip does not affect the fare, simply the number of zones that they travel wholly or partially through. If a rider begins a trip in Zone 4 and ends in Zone 2, they have traveled within three different zones and thus need a 3-Zone fare.

Caltrain has four primary fare products available to the general public. The price for each of these products, detailed below, varies by the number of zones the passenger will be traveling within.

- One-way ticket: passengers purchase a ticket for a single, one-way trip between two zones. This ticket is valid to use for four hours in a single direction.
- Day pass: passengers pay for unlimited rides on a single day within the selected number of zones. The cost of a day pass is equivalent to two one-way fares, and thus is essentially a round-trip ticket with an added benefit for those who use Caltrain more than two times in a single day.
- 8-ride ticket: passenger pays for 8 one-way fares at once, within a given number of zones, with a discounted price. 8-ride tickets are valid for 30 days from the date of purchase.[1]
- Monthly pass: passengers purchase a monthly pass for unlimited use within a given number of zones.

Figure 2: Caltrain Zone Map

Source: Caltrain, 2017. http://www.caltrain.com/stations/systemmap.html

Caltrain is a proof of payment system.[2] Passengers must have a valid fare before boarding the train, and cannot be purchased on-board from a conductor.[3] Tickets can be purchased at stations using ticket vending machines (TVMs). A ride can also be purchased by using a Clipper Card, a reloadable fare payment card. Value or passes can be added to a Clipper Card online or at a Clipper retailer. To use a Clipper Card, riders must "tap" on and off at card readers on station platforms before entering and after exiting the train.

Day passes can only be purchased at TVMs. 8-ride and monthly passes can only be purchased through Clipper and loaded onto Clipper Cards. One-way passes may be purchased at ticket vending machines or by using cash value on a Clipper Card. A 55-cent discount is offered for one-way tickets purchased using Clipper. Eligible Discounts are also available on all fare products for seniors, people with disabilities, youth, and Medicare cardholders. Table 3 below shows the prices by zone for each fare product.

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[1] Note that the 8-ride ticket was discontinued as a product as of October 1, 2017, but it is included in the analysis of this report.

[2] Caltrain's estimated ridership counts are related to the proof of payment system. Caltrain does not have fare gates, has multiple points of access to the station platforms and does not have Automated Passenger Counters (APCs) on its trains, As a result, Caltrain uses three different methods for reporting ridership: 1) Caltrain's Fare Media Sales Based Ridership, which estimates ridership based on the volume of ticket sales for each fare product each month; 2) National Transit Database (NTD) Ridership, which complies with a federal mandate for estimating annual ridership using a random selection of statistically valid rides checks and passenger counts to represent the transit agency's sample group; 3) Caltrain's Annual Ridership Count, which is an annual on-board ridership count conducted in January-March that is used to validate the monthly ridership estimation derived from fare media sales. This report primarily relies on the annual ridership estimates from Caltrain's Fare Media Sales Based Ridership.

[3] As of spring 2018, tickets can be purchased on a smart phone using the Caltrain Mobile Ticketing App.

Table 3: April 2017 Caltrain Fare Product Prices by Zone

Fare Product	How to Buy	Travel within					
		1 Zone	2 Zones	3 Zones	4 Zones	5 Zones	6 Zones
One Way	TVM	$3.75	$5.75	$7.75	$9.75	$11.75	$13.75
	Clipper Card	$3.20	$5.20	$7.20	$9.20	$11.20	$13.20
Day Pass	TVM	$7.50	$11.50	$15.50	$19.50	$23.50	$27.50
Zone Upgrade	TVM	$2.00 per zone					
8-ride	Clipper Card	$23.70	$38.50	$53.30	$68.10	$82.90	$97.70
Monthly Pass	Clipper Card	$84.80	$137.80	$190.80	$243.80	$296.80	$349.80
Eligible Discount Fare							
One Way	TVM	$1.75	$2.75	$3.75	$4.75	$5.75	$6.75
	Clipper Card	$1.60	$2.60	$3.60	$4.60	$5.60	$6.60
Day Pass	TVM	$3.75	$5.75	$7.75	$9.75	$11.75	$13.75
Zone Upgrade	TVM	$1.00 per zone					
8-ride	Clipper Card	$11.85	$19.25	$26.65	$34.05	$41.45	$48.85
Monthly Pass	Clipper Card	$42.40	$68.90	$95.40	$121.90	$148.40	$174.90

Source: Caltrain Fare Schedule, April 2017.

Go Pass Program

A fifth fare product is the Go Pass, a deep discount pass program that was established about 10 years ago. It allows large employers, residential properties, and educational institutions ("participants") to purchase annual unlimited-ride passes for employees, residents, or students at a deep discount. Go Passes are issued by affixing a sticker to an official employee, resident, or student ID card. A Go Pass is valid for travel on Caltrain in all zones, seven days a week, for one annual cost per user. Go Passes cannot be purchased by individuals.

The cost to participate in the program is a flat fee per user. "Users" are defined as all employees, residents, or students. Participants must purchase passes for all eligible users regardless of who will take advantage of the pass, but may choose to exclude classes of people from the user pool, such as part-time employees or undergraduate students. The 2017 cost of a Go Pass is $190 per year per user, with a minimum total annual cost of $15,960, or 84 users. The cost per user is less than one-fifth of the annual cost of purchasing a monthly Caltrain pass for a single zone, so even if a participant has fewer than 84 users, they still may receive a discount by participating in the program.

As of 2017, there are 119 participants in the program. Almost all participants are employers, but also three schools and one residential complex also participate in the program. There were over 83,000 eligible users for the program in 2017. Stanford University is the largest participant, with 31,479

total eligible users. The second through fifth largest participants have 8,917, 5,000, 3,669, and 2,197 eligible users respectively. Forty-two companies, or 35 percent of the participating companies, participate in the program despite having less than 84 eligible employees. The smallest participants in the program have 28, 23, and 20 eligible users respectively.

Fare Product Usage

The fare products described in the previous section are used with varying degrees of frequency by Caltrain riders. The 2016 share of riders using each product is shown in Table 4 below, which is based on responses to Caltrain's 2016 Triennial Survey. Monthly passes purchased on Clipper cards were the most common fare product used by surveyed riders, and Go Passes were second most common, together accounting for 56 percent of respondents. 8-ride tickets were the least commonly used fare product, used by only four percent of riders.

Table 4: 2016 Fare Product Usage

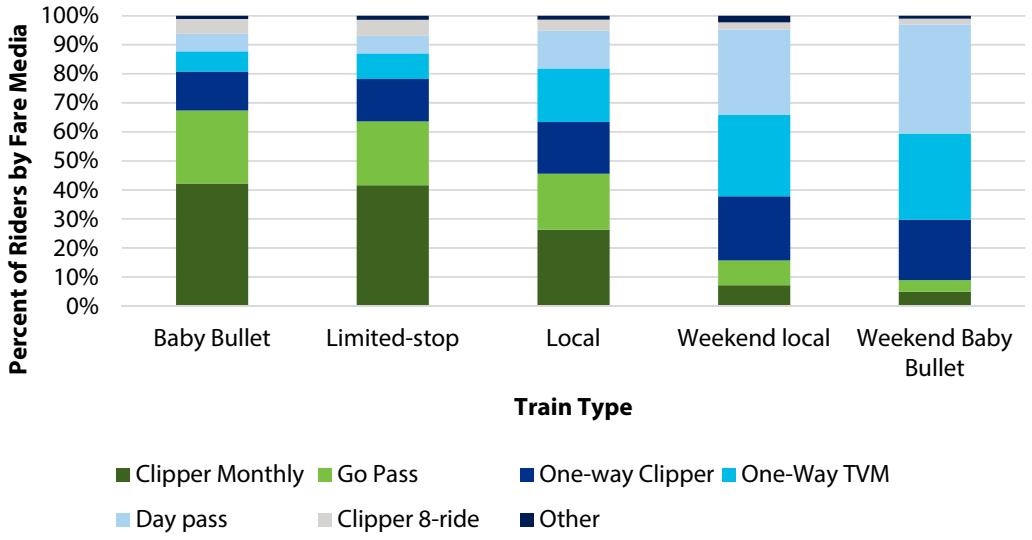
Fare Product	Estimate of Weekday Riders	Percent of Riders
Monthly	21,622	35%
Go Pass	12,845	21%
One-way Clipper Cash	9,856	16%
One-way TVM	7,844	13%
Day Pass	6,462	10%
8-ride Ticket	2,933	4%
Other/No Response	663	1%

Source: Caltrain Triennial Survey, 2016.

Fare Product Usage by Service and Time Categories

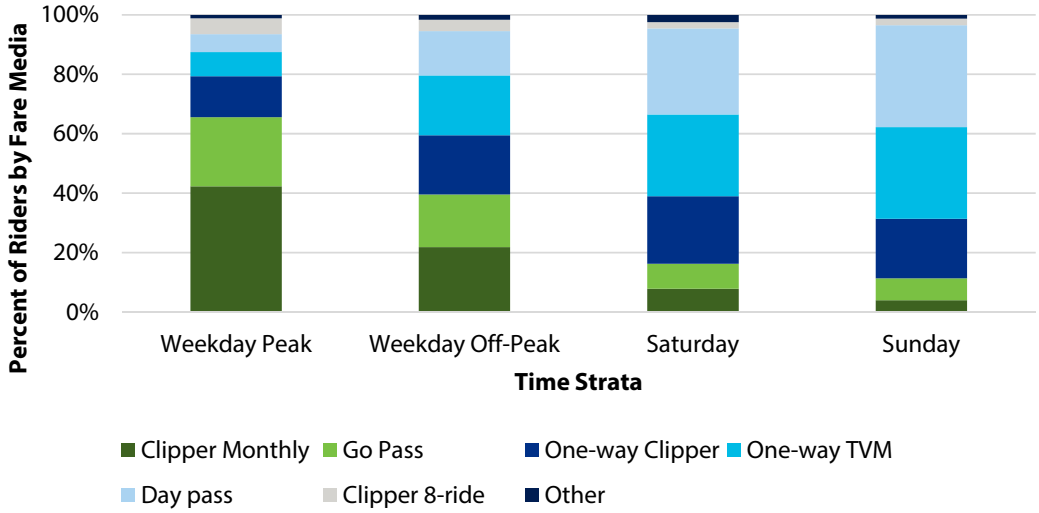
Fare products are used differently on different types of train services and times of the day. Figure 3 and Figure 4 show the fare product usage by train type and time of travel. Riders on weekday peak trains, including both Baby Bullet and Limited-stop trains, were most likely to use a monthly pass or Go Pass. Weekend riders were most likely to use one-way or day pass tickets, regardless of whether they ride a bullet or a local train, and were very unlikely to have a monthly pass or a Go Pass. Fare product usage was similar on Saturday and Sunday. Weekday off-peak riders used a variety of fare products, including monthly passes and Go Passes.

Figure 3: Fare Product Use by Train Service Type



Source: Caltrain Triennial Survey, 2016.

Figure 4: 2016 Fare Product Use by Time of Travel



Source: Caltrain Triennial Survey, 2016.

Frequency of Caltrain Use by Fare Product

Fare products that allow multiple uses, like the Monthly Pass and Go Pass, are also more commonly used by riders who take Caltrain more frequently, whereas single-use products are more common among infrequent users. Table 5 shows fare product usage by stated frequency of use of Caltrain. Among riders who use Caltrain between four and seven days per week, a high percentage use Monthly passes on Clipper, and a large proportion use Go Passes. Among riders who use Caltrain less than four times per week but more than once per month, a plurality use Clipper e-cash to pay for rides. For very infrequent riders who use Caltrain less than once a month, the most common payment method was a One-way ticket, with a Day-pass closely following as the second-most

common fare product. 8-ride tickets are most commonly used by riders who use Caltrain 2-3 days per week, although it is still less common than other fare products.

Table 5: 2016 Frequency of Caltrain Use by Fare Product

Fare Product	Days Ridden per week						1-3 Days/ Month	< 1 Day/ Month	All Riders
	6-7	5	4	3	2	1			
Clipper Monthly	49%	57%	39%	15%	2%	2%	1%	1%	35%
Go Pass	22%	28%	23%	20%	14%	13%	8%	4%	21%
One-way Fares									
Clipper Cash	10%	6%	17%	27%	36%	38%	41%	18%	16%
TVM	11%	3%	7%	14%	17%	23%	28%	38%	13%
Day pass	5%	3%	5%	6%	14%	19%	17%	37%	10%
Clipper 8-ride	0%	2%	9%	17%	13%	2%	3%	2%	5%
Other/No Response	2%	1%	0%	1%	4%	2%	3%	1%	1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Caltrain Triennial Survey, 2016.

The survey results also show that monthly pass holders take Caltrain more often than Go Pass holders. According to the 2016 Caltrain Triennial Survey, 74 percent of monthly pass holders take Caltrain 5 days a week compared to 61 percent of Go Pass users. Ten percent of Go Pass users take Caltrain 2 days per week or less, whereas few monthly pass holders take Caltrain this infrequently. Due to the higher cost of a monthly pass, it is only a good deal for frequent Caltrain users, and thus is unlikely to be purchased by someone who does not ride at least three times per week. The cost of a monthly pass (in 2017) equates to 12 to 13 round-trips a month or at least three times a week, depending on the number of zones one travels. Since Go Pass users typically have a pass paid for by their employer, they may be less concerned about riding Caltrain frequently enough to justify the cost of the pass. The per-user cost of a Go Pass equates to only seven round-trips *per year* for a six-zone trip, or 26 round-trips *per year* for a one-zone trip. No matter what zones the user travels through, the per-user cost of a Go Pass is cheaper than it would cost an individual to ride Caltrain once per week per year.

Fare Product Usage Over Time

Fare product usage has changed somewhat over time. Surveys are available from Caltrain for the years 2007, 2010, 2013, and 2016. Fare product usage for these years is shown by proportion in Table 6**,** and totals are shown graphically in Figure 5 below. Overall, usage of each fare product increased over the past 10 years, except 8-ride tickets, which decreased by half since 2007. 8-ride tickets replaced 10-ride tickets in 2009, and the validity period was shortened from 60 to 30 days in 2012, so declining usage may be a result of one of these changes or a combination of the two. The introduction of the Clipper Card in 2011 may have also changed which fare products riders prefer,

possibly reducing demand for 8-ride tickets and one-way tickets purchased at TVMs due to the convenience and discount of using Clipper Cash to pay for one-way fares.

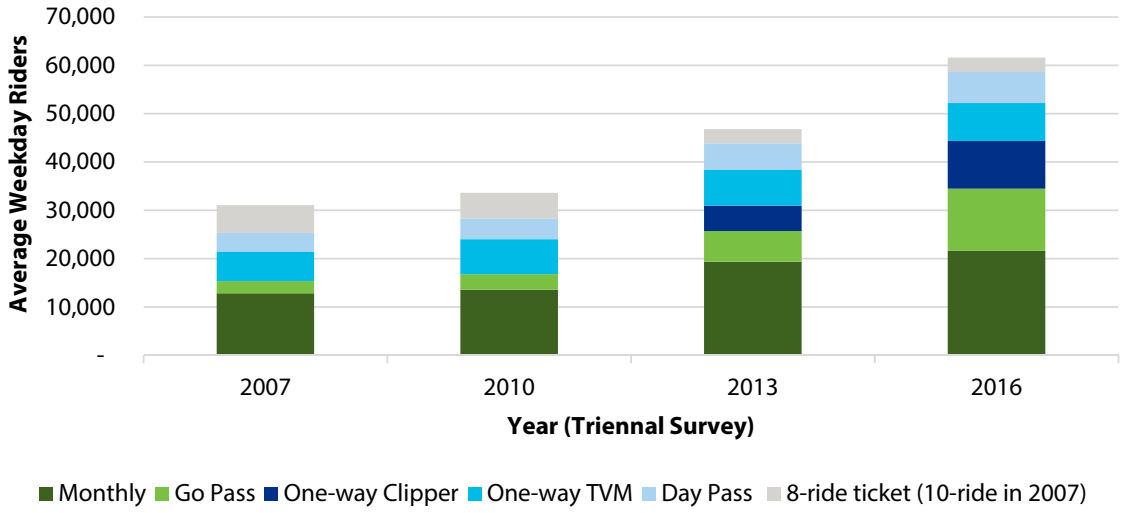
Only two fare products have increased usage proportional to other products: Clipper one-way fares and Go Passes. Both of these are relatively new products, so it is not surprising that they are a growing proportion of Caltrain ridership. Clipper offers a discount for one-way fares compared to the TVM price, which also likely played a part in the increased usage of Clipper. Much of the growth in ridership over the past 10 years has been in these two fare products, along with growth in Monthly Pass usage. Since 2013, Go Pass usage has doubled and Clipper Cash use increased by 87 percent.

Table 6: Fare Product Proportional Use, 2007 -2016

Fare Product	2007	2010	2013	2016
Monthly	41%	40%	41%	35%
One-way Fares	20%	21%	27%	28%
TVM	20%	21%	16%	13%
Clipper cash[1]	N/A	N/A	11%	16%
Go Pass	8%	9%	14%	21%
Day Pass	12%	13%	11%	10%
8-ride ticket (10-ride in 2007)	18%	16%	6%	5%
Other	1%	1%	1%	1%
Total	**100%**	**100%**	**100%**	**100%**

Notes:
1. Clipper was implemented in 2011.
Source: Caltrain Triennial Survey, 2007, 2010, 2013, and 2016.

Figure 5: Average Weekday Riders by Fare Product, 2007-2016



Source: Caltrain Triennial Survey, 2007, 2010, 2013, and 2016; Caltrain Annual Passenger Counts, 2007 – 2016.

Prices for most fare products were increased moderately at least once every two years since 2007. Year-to-year comparisons can't be made with Triennial Survey data, but the fare increases do not appear to have stopped the overall trend of increased ridership, and increased use of most fare products. The two fare products that remain relatively low in price compared to other fare products – Go Passes, which are purchased at a deep discount by employers and offered at a low or no cost to users, and tickets purchased with Clipper Cash, which provide a discount on one-way compared to tickets purchased at TVMs—have had the most growth.

3.4 Fare Revenue

This section shows the revenue from all fare products except for the Go Pass. Revenue is detailed by fare product, over time, and per rider.

Revenue by Fare Product

Total annual revenue[4] for the calendar year 2016 (January 1 – December 31, 2016) from the farebox was over $91.5 million.[5] Revenue by fare product is shown in Table 7. Thirty-four percent of this revenue is from monthly pass purchases, and 30 percent is from One-way ticket purchases, comprising the two largest sales categories and more than half of the annual revenue.

Table 7: 2016 Total Annual Farebox Revenue by Fare Product

Fare Product	2016 Annual Revenue	Percent of Total Revenue
Full-Price Products		
Monthly	$31,192,684	34.1%
One-way	$27,244,438	29.8%
Go Pass	$13,601,947	14.9%
Day Pass	$11,723,494	12.8%
8-Ride	$4,374,419	4.8%
Eligible Discount (ED) Products (Medicare, Senior, Youth, Disability)		
ED Monthly	$738,322	0.8%
ED One Way	$1,689,702	1.8%
ED Day Pass	$855,269	0.9%
ED 8 Ride	$116,192	0.1%
Total	**$91,536,467**	**100%**

Source: Caltrain JPB Fare Model Revenue Summary, 2016; Go Pass Fare Revenue, 2016.

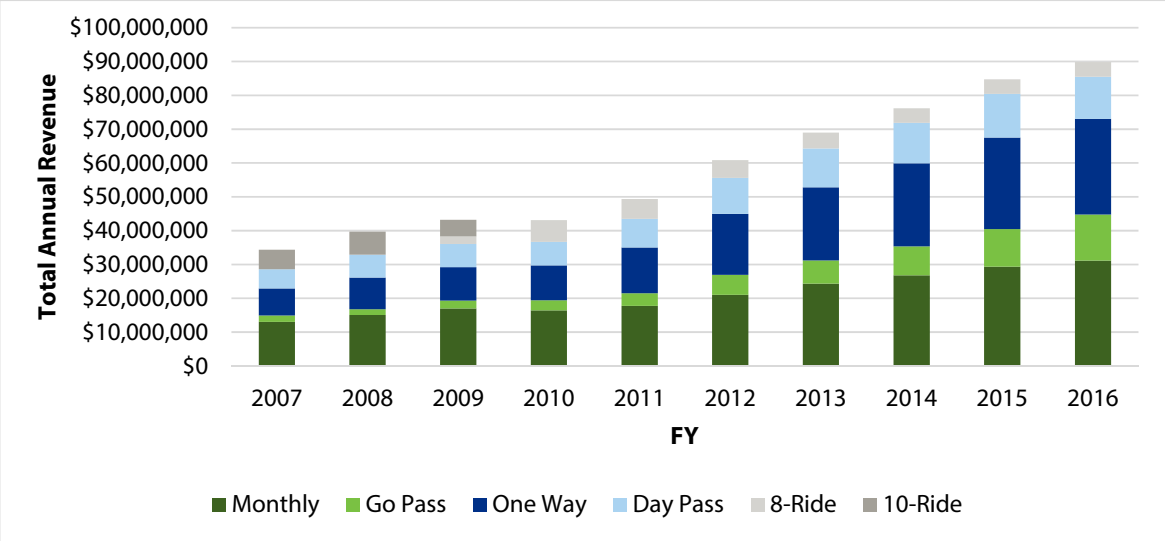
Figure 6 shows total annual revenue by fare product for the past ten years. Revenue by fare product has followed similar trends over time as ridership by fare product (Figure 5). Over the past 10 years, revenue from most fare products increased. There was a slight downturn in revenue during 2010, but total revenue since 2010 has increased at a higher rate than before 2010. Revenue from 8-ride passes, unlike most other fare products, has gone down since their introduction in 2009 when they

[4] Total revenue is derived from the agency's Treasury reports, and it is distinct from the revenue shown in the agency's financial statements.

[5] The calendar year, which is from January 1 – December 31, is distinct from Caltrain's fiscal year (FY), which is from July 1 – June 30. For FY 2016 (July 1, 2015 – June 30, 2016), Caltrain's total revenue was $89.8 million.

replaced 10-ride passes. A contributing factor to the decrease in 8-ride Ticket revenue may also be the introduction of the Clipper Card in 2011. After a slight downturn during the 2009-2010 financial year, the fastest growing revenue source has been One-way tickets. Monthly pass revenue has also had high growth over this time period.

Figure 6: Total Annual Revenue by Fare Product, 2007-2016



Note: One-way revenue includes Clipper day pass and paper tickets.
Source: Caltrain JPB Revenue, 2007 – 2016.

Revenue per Rider

Table 8 shows the total annual farebox revenue per rider since 2007. Revenue per rider increased more modestly than total revenue. Breaking down revenue and ridership by fare product may provide more insight into the reason for this trend, as discussed below.

Table 8: Revenue per Rider, 2007-2016

Year	Total Revenue[1]	Annual Riders	Revenue Per Rider
2009	$42,170,167	12,691,612	$3.32
2010	$44,626,215	11,967,716	$3.73
2011	$54,575,903	12,673,420	$4.31
2012	$64,869,236	14,134,118	$4.59
2013	$71,538,304	15,595,559	$4.59
2014	$79,655,843	17,029,447	$4.68
2015	$85,181,859	18,567,173	$4.59
2016	$91,536,467	19,233,427	$4.76

Notes:
1. Revenue has been adjusted to the calendar year and includes Go Pass revenue to be consistent with the ridership counts.
Source: Caltrain JPB Fare Model Revenue Summary, 2016; Go Pass Fare Revenue, 2007-2016; Caltrain Fare Media Sales Based Ridership, 2016.

It was possible to calculate the revenue per rider by fare product by analyzing a number of different data sources from October 2016, including revenue data, estimated monthly passenger counts, and Triennial Survey rider data. Completed in the month of October 2016, the Caltrain Triennial Survey provided information regarding fare product usage on passenger trips during the month of October 2016. By multiplying the fare product usage reported in the Triennial Survey by the total ridership estimate for the month of October 2016, it was possible to estimate the number of passengers using each fare product in the month of October 2016. Then, those figures were divided into the total revenue for each fare product for the month of October 2016, to estimate the revenue per rider by fare product, as shown in Table 9and Figure 7.

Per-rider revenue is highest for the paper One-way and Day Pass tickets. The revenue per rider for regular fare products is lowest for the Go Pass, and in fact is lower than the revenue per rider for some of the Eligible Discount tickets (such as the discounted One-way tickets purchased at TVMs). Revenue per rider using Clipper Cards is much lower than tickets purchased at TVMs, and the value of the revenue difference is larger than the price difference between the two products. This suggests that Clipper users may travel shorter distances than those who purchase tickets at TVMs (or, alternately, that Clipper users who travel longer-distances may be more likely to buy a higher value products such as 8-ride or Monthly Pass rather than a single-use One-way fare).

Table 9: October 2016 Revenue per Rider by Fare Product

Fare Product	October 2016 Revenue	October 2016 Riders	Revenue Per Rider
Full-Price Products			
Monthly	$2,644,349	539,578	$4.90
One-way - TVM	$1,222,561	161,806	$7.56
One-way - Clipper	$1,068,078	218,938	$4.88
Go Pass	$957,163	331,500	$2.89
Day Pass	$924,393	129,262	$7.15
8-ride	$379,260	71,133	$5.33
Eligible Discount (ED) Products (Medicare, Senior, Youth, Disability)			
ED Monthly	$69,325	26,830	$2.58
ED One-way – TVM	$77,442	22,929	$3.38
ED One-way – Clipper	$60,598	23,291	$2.60
ED Day Pass	$58,989	20,095	$2.94
ED 8-ride	$8,330	4,571	$1.82
Total	**$7,470,488**	**1,570,822**	**$4.76**

Source: Caltrain, 2017; Go Pass Fare Revenue, 2017; Caltrain Triennial Survey, 2016; Caltrain Fare Media Sales Based Ridership, 2016.

Figure 7: October 2016 Revenue per Rider for Fully Priced Fare Products

Source: Caltrain, 2017; Go Pass Fare Revenue, 2017; Caltrain Triennial Survey, 2016; Caltrain Fare Media Sales Based Ridership, 2016.

Revenue per Mile

Similar to revenue per rider by fare product, it was possible to estimate the revenue per passenger mile by fare product by analyzing a number of different data sources from the month of October 2016, including revenue data, estimated monthly passenger counts, and Triennial Survey rider data. The Caltrain Triennial Survey provided information regarding fare product usage on passenger trips during the month of October 2016. It also provided information about each passenger's boarding and alighting stations.

By calculating the distance of each trip between the stations and adding up the total miles traveled for passengers using each fare product, it was possible to estimate the average number of trip miles per passenger for each fare product. Then, it was possible to multiply the average trip distance by the estimated number of passengers riding using each fare product in the month of October 2016 to calculate the total trip miles traveled by passengers using each fare product. Ultimately, this total number of passenger miles for each fare product was divided into the October 2016 revenue total for each fare product, thus providing the revenue per passenger mile for each fare product.

Table 10 and Figure 8 show the average trip distance and revenue per mile by fare product for October 2016, drawing on. Day Pass users tend to travel the farthest, with an average trip length of almost 32 miles; in contrast, Go Pass users travel the shortest distances, with an average trip length of about 20 miles. For each fare product, passengers purchasing Eligible Discount tickets travel shorter distances than regular-fare passengers.

Similar to the revenue per rider, the highest revenue per mile is received from one-way tickets purchased at TVMs ($0.27 per mile) and day passes ($0.23 per mile), and the lowest of the regularly-priced products is the Go Pass ($0.14 per mile, or about half of the revenue per mile of one-way TVM tickets). The revenue per mile for one-way Clipper fares is also lower relative to tickets purchased at TVMs than would be expected simply from the price difference. Also of note, the

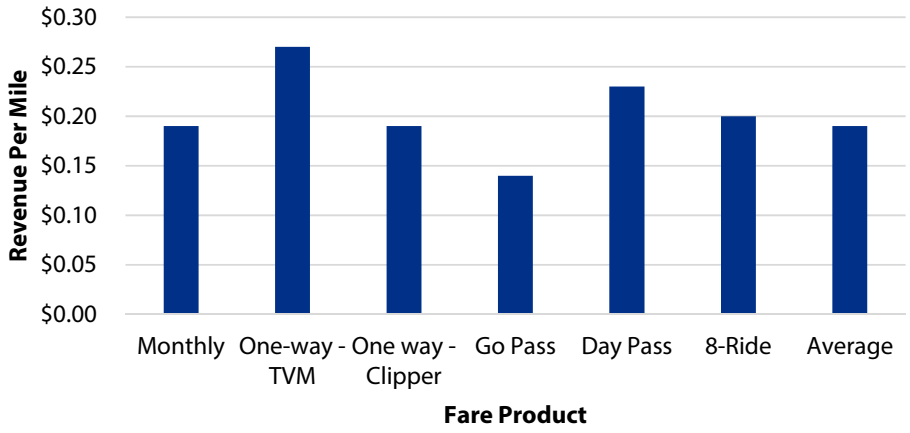
revenue per mile of $0.16 for the Eligible Discount One-Way TVM ticket is higher than the Go Pass revenue per mile ($0.14).

Table 10: October 2016 Revenue per Mile by Fare Product

Fare Product	October 2016 Revenue	October 2016 Riders	Average Trip Distance	Revenue per Mile
Full-Price Products				
Monthly	$2,644,349	539,578	25.06	$0.19
One-way - TVM	$1,222,561	161,806	28.69	$0.27
One-way - Clipper	$1,068,078	218,938	25.70	$0.19
Go Pass	$957,163	331,500	20.87	$0.14
Day Pass	$924,393	129,262	31.94	$0.23
8-Ride	$379,260	71,133	26.97	$0.20
Eligible Discount (ED) Products (Medicare, Senior, Youth, Disability)				
ED Monthly	$69,325	26,830	21.09	$0.13
ED One-Way – TVM	$77,442	22,929	22.26	$0.16
ED One-Way – Clipper	$60,598	23,291	20.69	$0.13
ED Day Pass	$58,989	20,095	27.48	$0.11
ED 8 Ride	$8,330	4,571	18.87	$0.09
Total	**$7,470,488**	**1,570,822**	**25.11**	**$0.19**

Source: Caltrain, 2017; Go Pass Fare Revenue, 2017; Caltrain Triennial Survey, 2016; Caltrain Fare Media Sales Based Ridership, 2016.

Figure 8: October 2016 Revenue per Mile for Fully Priced Fare Products



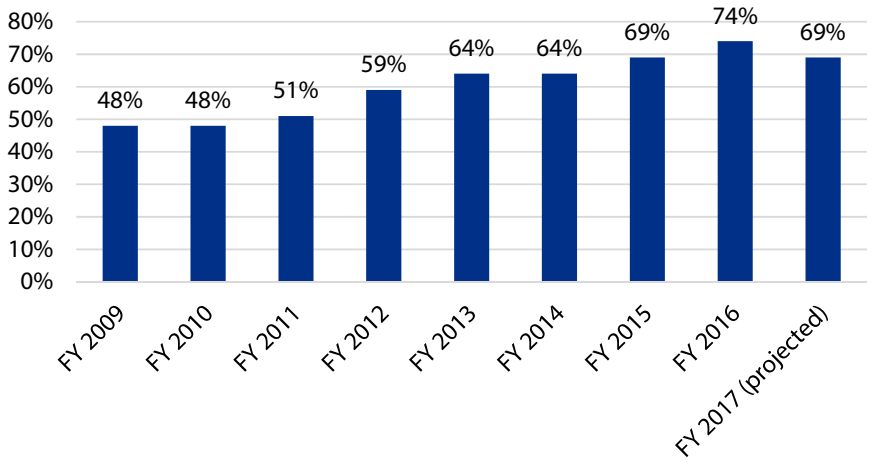
Source: Caltrain, 2017; Go Pass Fare Revenue, 2017; Caltrain Triennial Survey, 2016; Caltrain Fare Media Sales Based Ridership, 2016.

Farebox Recovery Ratio

The farebox recovery ratio is the percentage of annual operating costs that are recovered by annual fare revenue, or the total fare revenue divided by the total operational costs. Fare revenue has increased at a greater rate than costs in recent years, as evidenced by the farebox recovery ratios shown in Figure 9. This increase is likely driven by significant ridership increases contributing to

increased total fare revenue since 2010, rather than decreasing operating costs. The projected farebox revenue for FY 2017 shows a slight decrease over 2016. According to the National Transit Database, the average farebox recovery for commuter rail systems in the U.S. is 52 percent, so despite this slight projected downturn, Caltrain is still performing better than many similar systems.

Figure 9: Caltrain Farebox Recovery Ratios, FY2009 - FY2017



Source: Caltrain, 2017.

Go Pass Revenue

Table 11 shows the Go Pass program revenue since 2008. Participation and revenue have increased consistently throughout this time period, with the largest year-over-year increases in 2012, 2014, and 2016. In 2016, Go Pass revenue was 14.8 percent of total Caltrain fare revenue. It is important to note that the participation in the program shown in the table is for the total number of eligible users in the Go Pass program each year, rather than the ridership derived by the program. As noted above, 21 percent of Caltrain riders surveyed in 2016 were Go Pass users.

When the Go Pass program was introduced, the cost per user was $140 annually. The price didn't change until 2011, after which it increased by around $5 per year to $190 in 2016. Despite the price increases, participation in the program has continued to increase.

Table 11: Go Pass Participants and Revenue, 2008-2016

Year	Go Pass Cost per User	# of Participating Companies	# of Eligible Go Pass Users	Total Revenue
2008	$140	29	16,200	$1,691,711
2009	$140	35	20,407	$2,316,569
2010	$140	43	21,641	$3,009,588
2011	$155	50	25,608	$3,740,852
2012	$165	61	39,468	$5,939,961
2013	$165	72	41,345	$6,830,677
2014	$180	92	63,324	$8,579,179
2015	$180	116	63,985	$11,130,329
2016	$190	115	73,125	$13,601,947

Notes:
1. The cost of Go Pass per eligible user is prorated according to the month of the year when the employer, residential complex, or educational institution joins the Go Pass program. For example, if a company joins the program in May, the cost of each eligible user's Go Pass would be 7/12s of the annual cost of a Go Pass, so that they would not be charged for the previous four months of the year.
Source: Caltrain Go Pass Fare Revenue, 2008 – 2016.

3.5 Ridership and Demographics

This section describes the existing Caltrain ridership, ridership changes over the past 10 years, fare product usage, and rider demographics.

2016 Ridership

In 2016, the average weekday ridership on Caltrain was 62,416 boardings, according to Caltrain's Annual Ridership Counts, which are conducted annually in January, February and March.[6] During the AM peak, there was an average of 26,549 boarding, and in the PM peak there was an average of 26,253 boardings. The AM and PM peak are defined by Caltrain to include the trains that depart from its first station stop (San Francisco, San Jose Diridon, Tamien, or Gilroy stations) from 4:30 AM to 9 AM and from 3 PM to 7 PM. This wide peak definition includes a large majority of Caltrain riders; in 2016, only 10,904 boardings, or about 18 percent, occur outside these peak hours.

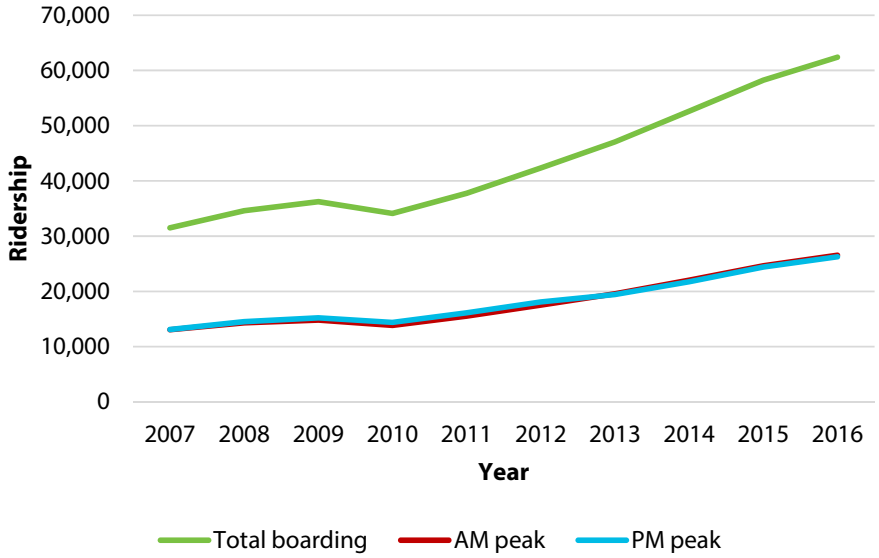
During the AM Peak, ridership is higher in the northbound direction than the southbound direction: there are nearly 15,000 boardings in the northbound direction compared to 9,000 in the southbound. The top five stations for AM peak northbound boardings are San Jose Diridon, Sunnyvale, Mountain View, Hillsdale, and Tamien, together accounting for 58 percent of boardings. Southbound boardings during the AM peak are more highly concentrated at the northern end of the system: approximately 50 percent of southbound AM peak passengers board in San Francisco, at either 4th and King Street or 22nd Street station.

[6] Caltrain operates on a Proof of Payment System, does not have fare gates, has multiple points of access to the station platforms, and does not have Automated Passenger Counters (APCs) on its trains. Caltrain conducts an extensive on-board ridership count in January/February/March each year.

Annual Ridership Trends

After a dip in 2010, annual Caltrain ridership has grown steadily through 2016. Both daily ridership and peak ridership doubled during this time period. Figure 10 shows this growth graphically. Growth slowed slightly in 2016.

Figure 10: Average Daily Ridership, 2007-2016



Source: Caltrain Annual Ridership Counts, 2007-2016.

Rider Demographics

Table 12 shows rider demographics and characteristics based on the Triennial Caltrain Rider Survey conducted in 2016 and the Metropolitan Transportation Commission (MTC) Origin-Destination Survey conducted in 2014.

Riders who fall under the senior, Medicare, or disability categories make up a small percentage of all fare products, and at the most make up nine percent of day pass users. Six percent of one-way ticket holders fall under these categories, and seven percent of one-way ticket holders are youth riders. Forty percent of all passengers do not have a vehicle available at home; day pass riders include the largest percentage of people without a vehicle available at home (61 percent of total day pass riders). Monthly pass holders and Clipper e-cash users are the most likely to have at least one vehicle at home.

There is not much variation in the home locations of riders by type of fare product used. Notably, only 11 percent of Day Pass users live in San Francisco, whereas 20 to 29 percent of users of the other fare products live in San Francisco. Day Pass users are more likely to live in Santa Clara County.

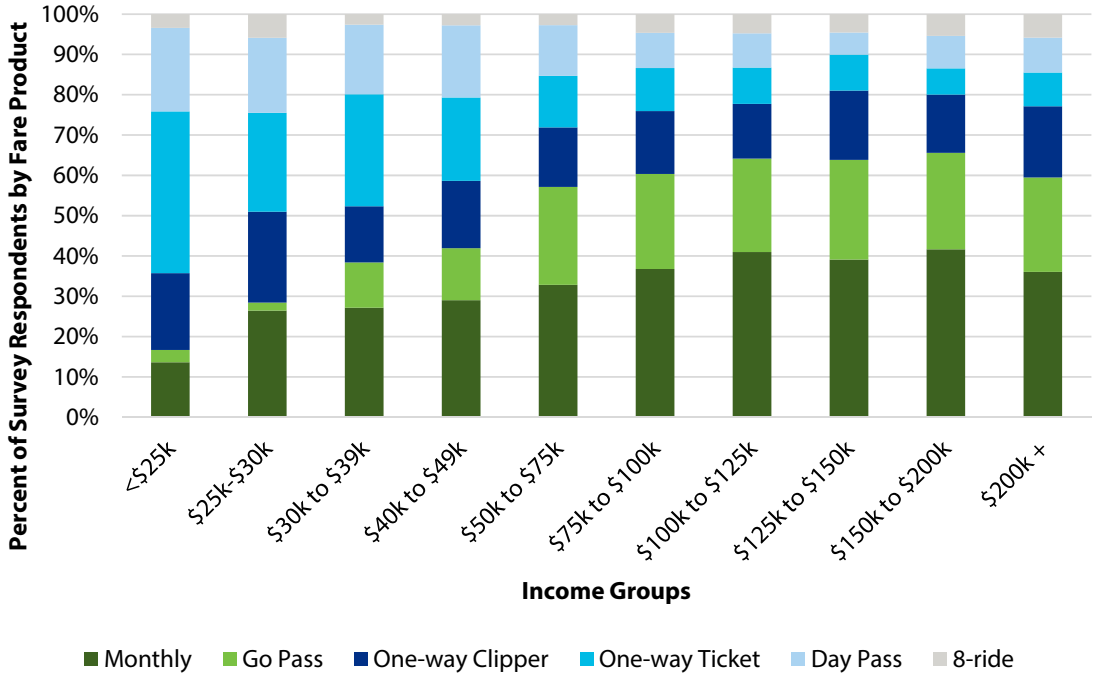
Ethnicity and race are also included in the table below. Three-quarters of Caltrain riders identify as white or Asian. White users are slightly more likely to use one-way Clipper tickets, Asian riders are more likely to use Monthly or 8-ride tickets, and black riders are more likely to use one-way TVM tickets or Day passes. Go Pass use closely reflects the overall racial makeup of Caltrain users.

Table 12: 2016 Rider Characteristics and Demographics

	All Riders	Monthly Pass	Go pass	One-way Clipper	One-way TVM	Day Pass	8-ride
Frequency of Use							
Take Caltrain 4+ days per week	64%	95%	81%	35%	23%	23%	46%
Take Caltrain 1-3 days per week	19%	4%	13%	40%	31%	22%	37%
Take Caltrain Less than once per week	17%	1%	5%	25%	45%	54%	17%
Total	100%	100%	100%	100%	100%	100%	100%
Fare Categories							
Senior/Medicare/Disabled	4%	3%	1%	5%	6%	9%	3%
Youth	3%	2%	2%	5%	7%	5%	3%
Regular (Adult)	93%	95%	97%	90%	87%	86%	94%
Total	100%	100%	100%	100%	100%	100%	100%
Vehicle Availability							
No vehicle available at home	41%	33%	38%	32%	47%	63%	48%
At least one vehicle available	59%	67%	62%	68%	53%	37%	52%
Total	100%	100%	100%	100%	100%	100%	100%
Home Location							
San Francisco County	23%	20%	27%	29%	22%	11%	27%
San Mateo County	30%	35%	25%	29%	35%	27%	25%
Santa Clara County	42%	43%	43%	35%	35%	53%	42%
Lives elsewhere	5%	2%	4%	8%	8%	9%	5%
Total	100%	100%	100%	100%	100%	100%	100%
Annual Household Income							
Under $50,000	16%	9%	5%	17%	38%	29%	12%
$50,000 to $100,000	24%	24%	27%	23%	23%	25%	19%
$100,000 to $150,000	22%	25%	25%	21%	16%	15%	22%
$150,000 to $200,000	15%	18%	17%	14%	8%	12%	18%
$200,000 or more	23%	24%	26%	25%	15%	19%	29%
Total	100%	100%	100%	100%	100%	100%	100%
Race and Ethnicity							
Asian	33%	38%	35%	29%	30%	23%	40%
American Indian Alaska Native	1%	1%	1%	1%	2%	1%	2%
Black/African American	3%	2%	3%	3%	6%	4%	1%
Hispanic/Latino	10%	9%	8%	9%	15%	16%	7%
Hawaiian pacific islander	1%	1%	2%	2%	2%	1%	1%
White/Caucasian	45%	44%	46%	51%	40%	50%	44%
Other	5%	5%	6%	5%	6%	5%	5%
Total	100%	100%	100%	100%	100%	99%	100%

Note: Percentages have been adjusted to exclude non-response answers
Source: Caltrain Triennial Survey, 2016.

Figure 11: 2016 Fare Product Usage by Income



Source: Caltrain Triennial Survey 2016.

The type of fare product used varies somewhat by annual household income, with Go Passes being particularly uncommon for lower income riders. This is shown in more detail in Figure 11. As annual household income increases, usage of high-value products like the monthly or Go Pass increases; in contrast, one-way tickets are the most common in the lowest income groups. Above incomes of $50,000, there is little variation in the distribution of fare products. In contrast, lower income riders' use of lower value and tickets purchased at TVMs is more common than other fare products. This may be because lower income riders are less likely to ride Caltrain frequently.

To examine this further, Table 13 below shows fare product usage by frequency of riding Caltrain for riders making less than $50,000 per year. Overall, low income riders take Caltrain less often; 33 percent of riders with incomes under $50,000 take Caltrain less than once per week, compared to 17 percent of all riders, and 47 percent low income riders take Caltrain four or more times per week, compared to 64 percent of all riders.

Compared to all riders, low income riders are more likely to use a single-use fare product and less likely to have a Monthly Pass or Go Pass, regardless of how often they ride Caltrain. The higher rate of one-way and day pass usage among low income riders raises equity concerns because these tickets have a higher per-ride cost than an 8-ride, monthly, or Go Pass.

Table 13: 2016 Fare Product Use by Frequency of Caltrain Use for Lower Income Riders

	Days Ridden per week								
	6-7	5	4	3	2	1	1-3 Days/ Month	< 1 Day/ Month	Total Low-Income Riders
Total Low Income Riders	9%	29%	9%	10%	6%	5%	9%	24%	100%
Fare Products									
TVM One Way	20%	15%	30%	36%	36%	32%	47%	44%	31%
Clipper Cash	20%	10%	22%	19%	36%	27%	24%	17%	18%
Day pass	12%	8%	6%	9%	15%	24%	24%	38%	18%
Go Pass	9%	13%	8%	7%	0%	11%	3%	1%	7%
Clipper 8-ride	0%	2%	5%	13%	10%	5%	2%	1%	3%
Clipper Monthly	39%	51%	30%	16%	3%	0%	0%	0%	23%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%

Note: Includes lower income riders with annual household income under $50,000.
Source: Caltrain Triennial Survey, 2016.

Rider Demographics Over Time

Table 14 shows rider demographics based on Triennial Surveys for 2007, 2010, 2013, and 2016. Some rider demographics have changed more than others over the last ten years. For instance, for frequency of Caltrain use, fare categories, and vehicle availability, the proportion of riders changed only slightly over the last ten years. In contrast, the home location of riders has changed substantially between 2007 and 2016. The proportion of riders who do not live in San Francisco, San Mateo, or Santa Clara Counties has decreased sharply, and the proportion of riders from San Mateo or Santa Clara Counties has increased accordingly; meanwhile, the proportion of riders who live in San Francisco County remained relatively stable.

Annual household income is another demographic characteristic that has changed substantially between 2007 and 2010. The percentage of riders in the lowest income brackets has decreased since 2007, while the percentage in the highest income brackets has increased. Additionally, since 2010, which was the first year race and ethnicity data was available from the survey, the percentage of white passengers has decreased, replaced primarily by growth in the percentage of Asian passengers. Other race and ethnicity groups did not change substantially over the period.

Table 14: Caltrain Rider Demographics Over Time, 2007-2016

	2007	2010	2013	2016
Frequency of Use				
Take Caltrain 4+ days per week	62%	64%	65%	64%
Take Caltrain 1-3 days per week	17%	18%	17%	19%
Take Caltrain Less than once per week	20%	18%	17%	17%
Total	100%	100%	100%	100%
Fare Categories				
Senior/Medicare/Disabled	5%	5%	4%	4%
Youth	4%	4%	2%	3%
Regular (Adult)	91%	91%	94%	93%
Total	100%	100%	100%	100%
Vehicle Availability				
No vehicle available at home	38%	39%	41%	41%
At least one vehicle available	62%	61%	59%	59%
Total	100%	100%	100%	100%
Home Location				
San Francisco County	21%	22%	22%	23%
San Mateo County	26%	30%	25%	31%
Santa Clara County	37%	31%	36%	43%
Lives elsewhere	16%	17%	17%	3%
Total	100%	100%	100%	100%
Annual Household Income				
Under $50,000	27%	30%	21%	16%
$50,000 to $100,000	31%	27%	29%	13%
$100,000 to $150,000	19%	20%	21%	22%
$150,000 to $200,000	10%	11%	14%	24%
$200,000 or more	12%	12%	15%	24%
Total	100%	100%	100%	100%
Race and Ethnicity				
Hispanic	N/A*	11%	11%	10%
Non-Hispanic:				
White	N/A*	55%	50%	45%
Asian	N/A*	22%	29%	33%
Black	N/A*	3%	4%	3%
Hawaiian/Pacific Islander	N/A*	1%	1%	1%
American Indian/Alaskan Native	N/A*	0%	1%	1%
Other	N/A*	8%	4%	5%
Total	N/A*	100%	100%	100%

*Race and ethnicity data were not available from the 2007 survey.
Source: Caltrain Triennial Survey 2007 to 2016.

The following tables show the distribution of fare products among different demographics from Triennial surveys going back to 2007.[7] The first set of tables shows fare product usage by race for 2010, 2013, and 2016 (this question was not asked in the 2007 survey). Although there are differences among fare product usage by race group, each group showed similar patterns over time. Go Pass use increased substantially over time for all groups. One-way TVM ticket use declined over time for all groups, while one-way Clipper fare use increased. Monthly pass and 8-ride pass use also decreased between 2010 and 2016 for all groups.

Table 15: Fare Product Usage by Race, 2010 & 2013

	2010				2013			
Fare Product	Asian	Black/ African American	Hispanic/ Latino	White	Asian	Black/ African American	Hispanic/ Latino	White
Monthly	48%	27%	32%	38%	46%	28%	34%	38%
Go Pass	8%	12%	4%	11%	13%	13%	13%	13%
One-way total	19%	37%	28%	21%	25%	40%	32%	27%
One-way TVM	19%	37%	28%	21%	14%	31%	23%	15%
One-way Clipper	N/A	N/A	N/A	N/A	11%	9%	9%	12%
Day Pass	10%	17%	19%	12%	8%	12%	15%	14%
8-ride	14%	7%	14%	17%	6%	5%	4%	7%
Other	1%	1%	3%	2%	2%	2%	2%	1%
Total	100%	100%	100%	100%	100%	100%	100%	100%

Source: Caltrain Triennial Survey, 2007 - 2016.

Table 16: Fare Product Usage by Race, 2016

	2016			
Fare Product	Asian	Black/ African American	Hispanic/ Latino	White
Monthly	39%	24%	30%	34%
Go Pass	22%	20%	16%	21%
One-way total	25%	40%	32%	29%
One-way Ticket	11%	23%	18%	11%
One-way Clipper	14%	17%	14%	18%
Day Pass	7%	12%	16%	11%
8-ride	6%	2%	3%	5%
Other	1%	2%	2%	1%
Total	100%	100%	100%	100%

Source: Caltrain Triennial Survey, 2007 - 2016.

[7] For Table 15 and Table 16, only the largest racial and ethnic groups were included in these tables; the other groups were too small to show reliable patterns by fare product and over time.

The following tables show fare usage over time by annual household income. Between 2007 and 2010, Go Pass usage increased primarily for all income groups earning over $50,000 per year, while it remained relatively steady for those riders in households earning less than $50,000 per year. Day Pass and One-way tickets purchased at TVMs decreased slightly for higher income groups while maintaining a similar proportion across the survey years for lower income groups. Clipper use increased similarly across income groups over the period, as 8-ride Ticket use decreased among all income groups. Usage of the Monthly Pass also generally declined across all income groups between 2007 and 2016.

Table 17: Fare Product Usage by Annual Household Income, 2007 & 2010

	2007					2010				
Fare Product	Under $50k	$50k to $100k	$100k to $150k	$150k to $200k	$200k or more	Under $50k	$50k to $100k	$100k to $150k	$150k to $200k	$200k or more
Monthly	27%	43%	50%	50%	43%	30%	46%	42%	44%	40%
Go Pass	6%	10%	9%	9%	5%	4%	13%	12%	11%	12%
One-way total	33%	17%	11%	9%	13%	35%	16%	16%	13%	16%
One-way Clipper	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
One-way TVM	33%	17%	11%	9%	13%	35%	16%	16%	13%	16%
Day Pass	17%	10%	8%	9%	14%	16%	10%	11%	10%	13%
8-ride	14%	18%	21%	24%	22%	14%	14%	17%	21%	17%
Other	2%	1%	1%	1%	3%	2%	2%	2%	2%	3%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: Caltrain Triennial Survey, 2007 - 2016.

Table 18: Fare Product Usage by Annual Household Income, 2013 & 2016

	2013					2016				
Fare Product	Under $50k	$50k to $100k	$100k to $150k	$150k to $200k	$200k or more	Under $50k	$50k to $100k	$100k to $150k	$150k to $200k	$200k or more
Monthly	25%	41%	46%	49%	42%	22%	34%	40%	41%	36%
Go Pass	6%	15%	15%	17%	13%	7%	23%	24%	24%	23%
One-way total	43%	25%	22%	18%	25%	48%	26%	24%	21%	26%
One-way Clipper	12%	10%	11%	11%	15%	18%	15%	15%	14%	17%
One-way TVM	31%	15%	11%	7%	10%	30%	11%	9%	6%	8%
Day Pass	19%	11%	8%	9%	12%	19%	10%	7%	8%	9%
8-ride	5%	7%	6%	6%	7%	3%	4%	5%	5%	6%
Other	2%	2%	2%	1%	2%	2%	2%	1%	1%	1%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: Caltrain Triennial Survey, 2007 - 2016.

Go Pass User Demographics

Go Pass user demographics and characteristics are shown in Table 19 below. Over 80 percent of Go Pass users take Caltrain at least four days per week. Very few Go Pass holders are in the Senior, Medicare, or Disability discount categories or are youth riders, and a slightly lower proportion compared to all Caltrain riders are without a vehicle at home. Incomes of Go Pass users are slightly higher than for all Caltrain riders. Specifically, a lower proportion of Go Pass users compared with all Caltrain riders have incomes under $50,000 per year. The racial makeup of Go Pass users is similar to the overall Caltrain ridership.

Caltrain also conducted a Go Pass user survey in 2015. According to this survey, 34 percent of respondents did not use Caltrain prior to receiving a Go Pass. Respondents who previously used Caltrain rode on average only 1.5 days per week; confirming this, 81 percent stated that they used one-way tickets or day passes on Caltrain, which are products that are typically used by less frequent riders. After receiving their Go Pass, respondents estimated they would use Caltrain 2.4 days per week on average. This is lower than was found in the Triennial Survey detailed above in Table 10, where over 80 percent of Go Pass users indicated that they rode 4+ days a week. It is worth noting that a large portion of the Go Pass survey respondents were new Go Pass recipients, so they may have underestimated how often they would use Caltrain, or possibly some who thought they would use Caltrain only a few days a week in reality didn't use it at all.

Table 19: 2016 Go Pass User Demographics

	All Caltrain Riders	Go Pass Riders
Frequency of Use		
Take Caltrain 4+ days per week	63%	81%
Take Caltrain 1-3 days per week	19%	13%
Take Caltrain Less than once per week	17%	5%
Total	100%	100%
Rider Characteristics		
Senior/Medicare/Disabled	4%	1%
Youth	3%	2%
Regular (Adult)	93%	97%
Total	100%	100%
Vehicle Availability		
No vehicle available at home	41%	38%
At least one vehicle available	59%	62%
Total	100%	100%
Home Location		
San Francisco County	23%	27%
San Mateo County	30%	25%
Santa Clara County	42%	43%
Lives elsewhere	5%	4%
Total	100%	100%
Annual Household Income		
Under $50,000	16%	5%
$50,000-100,000	24%	27%
$100,000-150,000	22%	25%
$150,000 to $200,000	15%	17%
$200,000 or more	23%	26%
Total	100%	100%
Race and Ethnicity		
Asian	33%	35%
American Indian Alaska Native	1%	1%
Black/African American	3%	3%
Hispanic/Latino	10%	8%
Hawaiian Pacific Islander	1%	2%
White/Caucasian	45%	46%
Other	5%	6%
Total	100%	100%

Source: Caltrain Triennial Survey, 2016; MTC OD Survey, 2014.

3.6 Policy Considerations

Important policy considerations arise of out of this existing conditions research. Analysis of Caltrain's fare revenue, rider demographics, and fare product usage patterns indicates that there is an equity question with Caltrain's current fare products and pricing. Specifically, there are large differences between the fare products regarding how much revenue they earn per passenger and per passenger mile, and there are also differences regarding which fare products are more likely to be used by passengers in different income groups. Revenue per passenger and revenue per passenger mile are highest for one-way TVM and day pass products, two products that are more likely to be used by lower income riders. In contrast, revenue per passenger and revenue per passenger mile are lowest for Go Pass, which is more likely to be used by higher income riders. Ultimately, this means that Caltrain derives more revenue per passenger and per passenger mile from products that are more likely to be used by lower income riders, while its higher income riders are more likely to use products that earn Caltrain less revenue per passenger and per passenger mile.

Recognizing that equity is one of many policy priorities the agency must consider, should the agency strive for greater equity outcomes in its fare-related decisions? What strategies could be deployed to effectively introduce greater equity into Caltrain's current fare products, pricing, and programs? For example, could the agency consider changes that would have the effect of making the revenue earned per passenger and per passenger mile more equitable across Caltrain's fare products? For instance, informed by the data regarding different demographic groups' fare product usage patterns, could the pricing of existing fare products be adjusted to help address these discrepancies, so that there are no longer large differences between the revenue earned per passenger and per passenger mile for each fare product? Or, could new fare products help balance equity in Caltrain's fare structure?

3.7 Parking

Caltrain charges a flat $5.50 daily parking fee for parking at all of its stations regardless of demand, with the exception of free parking available at Tamien, Capitol, Blossom Hill, San Martin, and Gilroy. The daily parking rate was increased in July 2016 from $5 to $5.50. Monthly parking permits are also available for $55, and are sold only in conjunction with Monthly Pass or 8-ride tickets. Prior to Clipper, riders were required to purchase two 10-ride tickets or 8-ride tickets to be eligible to purchase monthly parking passes. The $55 price is approximately a 50 percent discount compared to the daily fee, assuming 20 days parked per month. These parking fees were last raised in July 2016, from $5 per day and $50 per month.

Occupancy

The average parking lot occupancy at Caltrain stations was 65 percent in February and March 2017. Parking occupancy by station is shown in Table 20 below. Usage at most stations has individually increased over this time period, with the exception of Burlingame, Belmont, San Antonio, and Sunnyvale. Ten stations were observed to have occupancies over the 85 percent practical capacity level in 2017, which is the point at which it becomes difficult for an arriving driver to quickly find an available parking space. Most of these high-occupancy stations are served by Caltrain's Baby Bullet service, but the San Carlos and Santa Clara stations, which are not served by Baby Bullet trains, also

had high occupancies. San Carlos and Santa Clara are both adjacent to large stations with very high parking occupancy—Redwood City and Diridon—and thus may experience spillover parking when the adjacent stations fill up.

Table 20: February and March 2017 Parking Occupancy at Baby Bullet and Non-Baby Bullet Stations

Bullet Service	
Station	% Occupancy
San Francisco	N/A
22nd Street	N/A
Millbrae	93%
San Mateo	81%
Hillsdale	98%
Redwood City	90%
Menlo Park	43%
Palo Alto	90%
California Ave.	74%
Mountain View	95%
Sunnyvale	98%
San Jose Diridon	100%
Tamien*	100%

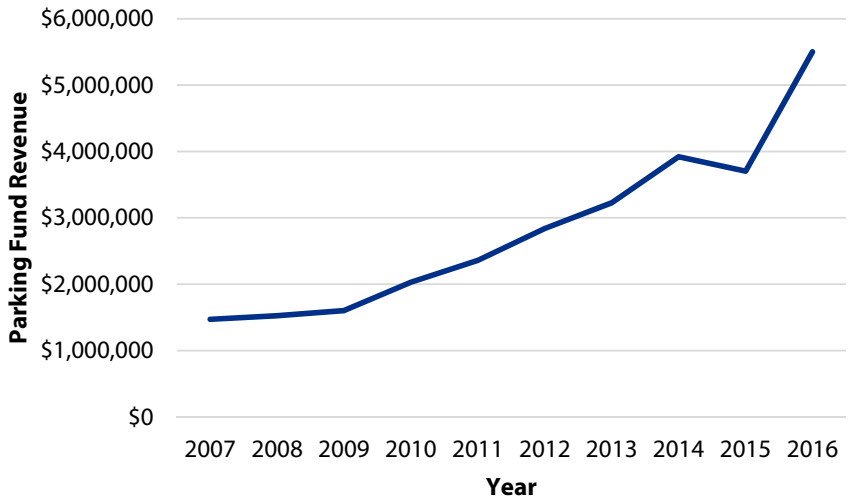
No Bullet Service	
Station	% Occupancy
Bayshore	11%
South SF	65%
San Bruno	56%
Burlingame	35%
Hayward Park	21%
Belmont	16%
San Carlos	99%
San Antonio	38%
Lawrence	41%
Santa Clara	89%
Capitol*	59%
Blossom Hill*	19%
Morgan Hill*	68%
San Martin*	50%
Gilroy*	64%

= Parking Occupancy > 85%
* = Free parking at this lot.

Revenue

Figure 12 shows the annual revenue for daily and monthly parking passes purchased at Caltrain Stations and at the SamTrans Central Office. Like ridership, Caltrain ticket revenue, and parking occupancy, the trend for parking revenue is generally positive over the past 10 years. There was a slight decrease in revenue in 2015, but this was more than made up for by high revenue in 2016. The increase in revenue is likely a combination of increased ridership and parking usage, and increased parking fees: in 2006, parking was $2 per day or $20 per month, and increased to $5.50 per day and $55 per month by 2017.

Figure 12: Caltrain Station Parking Revenue, 2007-2016



Source: Caltrain Parking Revenue, 2007- 2016.

Note: The revenue in this graph comes from daily and monthly parking passes purchased at the Caltrain station ticket vending machines and at the SamTrans Central office. It does not include revenue that is counted separately, such as parking revenue from BART, Levi's Stadium, or citation parking revenues.

4 Research and Peer Comparison

This Research and Peer Comparison chapter serves to provide a broader context for fare policy at Caltrain. It presents key research findings from primary and secondary sources on fare structures and policies at other transit agencies and culminates in key lessons learned for Caltrain.

In the first section of this report, a basic review of existing research into fare policy, with an emphasis on price elasticities, is presented. Two major reports from the Transit Cooperative Research Program (TCRP) provided a mix of primary and secondary research for this purpose.

The second section of this report presents basic information about fares at peer transit agencies. The fare information for 19 rail transit providers was compiled using publicly available sources. The transit systems studied include Altamont Corridor Express (ACE), Bay Area Rapid Transit (BART), Amtrak's Capital Corridor, and North County Transit District (NCTD) Coaster, as well as the fifteen highest-ridership commuter railroads in the United States (of which Caltrain is ranked seventh). The fares charged by these operators provide a sense for how Caltrain's fares compare to other, similar agencies. An analysis of the cost of monthly and multi-trip passes compared to base fares is also presented. Finally, key findings from a study of off-peak discounts are summarized, from several commuter railroads that employ peak period pricing, including four U.S. and three international systems.

Peer Comparison Highlights

- Caltrain's fares were found to be about average compared to peer agencies.
- A majority of the peer systems studied use a zone-based fare structure.
- Caltrain was found to have the highest farebox recovery ratio of all the commuter rail systems studied. This is attributed to the recent growth in ridership and revenue while service and costs have remained relatively flat.
- Peak/off peak fares are not common in the United States.
- Means-based fare programs are growing on the West Coast, and transit agencies partner with external agencies to do the means-testing.
- Peer systems' reported price elasticities ranged from -0.13 to -0.22.
- Peer agency staff strongly endorsed frequent, planned, and predictable fare changes, to improve budgeting and planning processes; reduce pressure on the Board; and help manage fare expectations with the public.

Perhaps the most reliable and compelling information about how commuter rail agencies set fares came directly from representatives of the agencies themselves. The third section of this report summarizes interviews that were conducted with some of the individuals responsible for fare policy at six railroads.

The final section of this report presents some of the key lessons learned for Caltrain as it relates to fare policy, products, and structure.

A Note on TCRP Sources

In 2003, TCRP released TCRP Report 94: Fare Policies, Structures, and Technologies: Update. The next year, TCRP published Traveler Response to Transportation System Changes Handbook, Third Edition.

Chapter 12, titled Transit Pricing and Fares, focused entirely on fare policy, including the relationship between fares and ridership.

TCRP Report 94 describes the full range of options for fare policy, including fare-setting, discount programs, and fare-related technologies. While it is somewhat out of date, it contains a wealth of information on how many different agencies were operating at that time.

Since the TCRP handbook was published, very little new scholarly research has been conducted on fare elasticities (and evidently none on commuter rail). Despite having been published in 2004, this makes the handbook the best available synthesis on the topic of fare elasticities. The book provides some very valuable insights into what agencies can expect when modifying their fare structure.

4.1 Elasticity of Demand for Commuter Rail

Definition

The economic concept of price elasticity of demand simply describes the relationship between the price of a good and the quantity of that good that is consumed. In simple mathematical terms:

$$Price\ Elasticity\ of\ Demand\ (PED) = \frac{\%\ change\ in\ quantity\ demanded}{\%\ change\ in\ price}$$

Values of price elasticity of demand that are greater than the absolute value of 1.0 are said to be elastic, since consumption changes by a greater percentage than the price. An example of an elastic value is 1.2, where a 10 percent change in the price results in a 12 percent change in consumption. A good that is highly elastic is a price-sensitive good, because a small change in price results in large changes in consumption.

Values of price elasticity of demand that are less than the absolute value of 1.0 are said to be inelastic. An example of an inelastic value is 0.8, where a 10 percent change in price results in an 8 percent change in consumption. A good that is inelastic or has low elasticity means that prices have little effect on consumption of the good, so it is not price sensitive. Perfectly inelastic demand (0) would mean that regardless of the price, people will consume the same amount.

The degree of price sensitivity refers to the absolute value of elasticity and whether it is greater than or less than the absolute value of 1.0, regardless of whether or not the value is positive or negative. The positive or negative sign indicates the direction of the change in demand and whether it increases or decreases. Generally, values for elasticity are negative, meaning that as the price goes up, people consume less of the good. A positive elasticity, in which the demand for a good goes up as its price goes up, is feasible but rare for obvious reasons.

Of course, price is not the only determinant of demand. In the case of Caltrain, ridership has continued to grow despite increasing fares, but this could not be reasonably interpreted as a positive elasticity,

since the increase in ridership is probably due to external factors, such as growth in population and employment. It is unlikely that ridership increased as a result of fares going up. A realistic elasticity for a public transportation system, based on the studies compiled for TCRP 94, might be -0.2, in which case a 10 percent increase in fares would correspond to a 2 percent decrease in ridership.

For simplicity in this chapter, all elasticities are assumed to be linear for the range of fare prices in question. In other words, the same elasticity is applied whether raising or lowering the fare, and whether the fare is changed a small or a large amount.

Commuter Rail Elasticity

Practically all estimates of fare elasticities on transit are inelastic, between 0 and -1.0. Most transit systems are in the elasticity range of 0 to -0.3, meaning that most riders are not very price sensitive and significant fare increases could be made that would generate additional revenue for transit agencies. In other words, it is broadly understood that an increase in fares will lead to an increase in revenue, notwithstanding considerations about economic development and social equity.

With respect to commuter rail in particular, the TCRP Traveler Response to Transportation System Changes Handbook mentions four commuter rail elasticity studies between 1977 and 1997 in Australia, Boston, and New York. Elasticity calculations range from -0.09 to -0.22. Original research for this project involved interviews with representatives from six commuter rail providers, and several of these organizations provided a sense for their expectations of price elasticity when changing fares; all of them cited overall elasticities within that same range.

While research focusing on commuter rail has been rare, there are several general characteristics of transit price elasticity that inform the commuter rail fare context. First, demand for rail is almost universally less elastic than demand for bus. Rail ridership is estimated to be twice as resistant to changes in fare.

Additionally, demand for transit is less elastic in large cities. This may be a function of heavy automobile traffic in larger cities; the alternatives to transit are poor. This suggests a low cross elasticity, meaning it's harder to substitute auto for rail.

Finally, demand for off-peak service is about twice as elastic as demand for peak period service. Commuter railroads generally have a higher share of peak period users than other transit systems, making ridership less sensitive to fare changes. Another result of peak riders being less fare sensitive is that raising fares without providing any relative discount for off-peak travel will generally widen the swings in demand between peak and off-peak travel. In other words, it will focus demand in the peak, potentially exacerbating capacity issues.

With respect to demographics, low-income riders (who may not have the alternative of the car) tend to be less sensitive to changes in fare than the general riding population. In other words, "choice riders," who have a vehicle or another viable transportation alternative, are actually more likely to abandon a

transit system than those who may have lower incomes but are dependent on transit. Of course, low-income riders can also be priced out of commuter rail, which tends to be more expensive than other transit services.

There is scant evidence for differences in price elasticity of demand by age, though the requirement that all transit systems charge half fare for senior citizens does not seem to have led to any great increase in senior citizen ridership. Discounts for youth are also very common, but there are no available estimates for the effect of those discounts on ridership.

4.2 Comparison with Peer Systems

To put Caltrain fares into context, the fare structures of peer systems were analyzed. Caltrain is, by ridership, the 7th largest commuter railroad in the United States. The top 15 systems are included in this analysis, along with other transit systems located in the Bay Area, as of May 2017. Some results of that analysis are below, and additional information has been provided in Appendix A.

Fares

Table 21shows estimated annual ridership, fare structure (station-to-station or zones; zones are groups of adjacent stations with equal fares), and whether peak period pricing is employed for each of the rail systems identified as Caltrain's peers.

Twelve of these railroads operate with a zonal fare system and the remaining seven specify fares by station-to-station pair. Generally, zonal fares are regarded as easier to understand for passengers once they understand the zone calculations, while station-to-station fares are more flexible and can be seen as more fair. With zones, trips of unequal length are priced the same way. The result is that a relatively short trip could end up being expensive if it happens to cross a zone boundary.

Table 21: Peer System Characteristics

System	Location	Type	Annual Ridership (2016)	Peak fares?	Fare structure
BART	Bay Area	Urban	129,000,000	No	station-to-station
MTA LIRR	NYC/Long Island	Commuter	103,196,800	Yes	zones
NJ Transit Rail	NYC/New Jersey	Commuter	88,050,000	No	zones
MTA MNR	NYC/New York/Connecticut	Commuter	86,302,500	Yes	zones
Metra	Chicago	Commuter	72,891,500	No	zones
SEPTA Regional Rail	Philadelphia	Commuter	35,453,700	Yes	zones
MBTA	Boston	Commuter	33,749,600	No	zones
Caltrain	Bay area	Commuter	19,038,300	No	zones
Metrolink	Los Angeles	Commuter	10,903,000	No	station-to-station
MARC	DC/Maryland	Commuter	8,980,600	No	station-to-station
UTA FrontRunner	Salt Lake City	Commuter	4,545,800	No	station-to-station

VRE	DC/Virginia	Commuter	4,496,000	No	zones
RTD	Denver	Commuter	4,317,400	No	zones
Tri-Rail	Miami	Commuter	4,175,000	No	zones
Sounder	Seattle	Commuter	4,163,400	No	station-to-station
South Shore Line	Chicago/Indiana	Commuter	3,503,700	No	zones
Capitol Corridor (Amtrak)	Bay area	Intercity	1,573,200	No	station-to-station
Coaster	San Diego	Commuter	1,503,700	No	station-to-station
ACE	Bay area	Commuter	1,295,500	No	zones

Source: APTA, Public Transportation Ridership Report Q4 2016 (http://www.apta.com/resources/statistics/Documents/Ridership/2016-q4-ridership-APTA.pdf); Agency websites, May 2017.

One-way Fares

Table 22 shows the base (lowest) and maximum fare for each of the peer systems, ordered by the base fare, from highest to lowest, as of May 2017. Also included are the length of the longest line on each system and a price per mile, equal to the maximum fare divided by the length of the longest line. This is a somewhat crude approximation of price per mile of travel, which would ideally be calculated as an average; doing this, however, would require a large amount of data on actual system usage and was not practical within the scope of this project.

Of the 19 systems, Caltrain has the 11th highest base fare, 8th highest maximum fare, and 12th highest price per track mile. In short, Caltrain's fares are about average, despite being in an expensive market.

Table 22: One-Way Fares

System	Base fare	Max fare	Longest Line Track Miles	Fare per mile
MTA Long Island Rail Road	$8.75	$29.25	120.0	$0.24
MTA Metro-North Railroad	$8.00	$26.25	88.0	$0.30
Amtrak - Capitol Corridor	$6.00	$43.00	168.0	$0.26
MARC Train	$5.00	$13.00	63.3	$0.21
ACE	$4.25	$14.50	86.0	$0.17
Coaster	$4.00	$5.50	41.1	$0.13
SEPTA Regional Rail	$3.75	$9.00	38.7	$0.23
Metra	$3.75	$10.75	70.5	$0.15
VRE	$3.30	$11.55	55.0	$0.21
Sounder	$3.25	$5.75	48.0	$0.12
Caltrain	$3.20	$13.20	76.6	$0.17
South Shore Line	$3.00	$13.25	90.0	$0.15
Denver RTD	$2.60	$4.50	23.0	$0.20
UTA FrontRunner	$2.50	$9.70	88.0	$0.11
Tri-Rail	$2.50	$6.90	70.9	$0.10

NJ Transit Rail	$2.25	$16.75	48.1	$0.35
MBTA	$2.25	$12.50	62.9	$0.20
BART	$1.85	$7.20	52.3	$0.14
Metrolink	$1.75	$16.75	100.1	$0.17

Note: Fares include any discounts for using reusable fare media, such as the fare for using Clipper Card for Caltrain.
Source: Agency websites, May 2017.

Monthly

Some but not all peer agencies offer monthly passes. Data on monthly pass prices for each of the peer systems allowed us to compute multipliers that quantify the discount that a monthly pass provides. By dividing the minimum monthly pass cost by the minimum base fare, a base multiplier can be derived. Likewise, by dividing the maximum monthly pass cost by the maximum single fare, a second multiplier can be derived for those paying the maximum fares. Table 23 shows the monthly fares and multipliers, ordered by the monthly multiplier for maximum-fare trips.

As a general trend, systems tend to give a larger discount to those making the longest trips, though several systems do the reverse. Caltrain provides the same discount regardless of the individual trip length, a straight multiplier of 26.5. Caltrain ranks 8th out of 18 systems for the maximum-fare monthly multiplier, and 14th out of 18 systems for the base fare multiplier. Compared to other systems, Caltrain's longer-distance (and higher-spending) commuters are enjoying less of a monthly pass discount. Generally, however, Caltrain's monthly pass products are in line with what peer systems are doing.

Table 23: Monthly Fares

System	Base Monthly	Max Monthly	Base Monthly Multiplier	Max Monthly Multiplier
Denver RTD	$99.00	$171.00	38.1	38.0
Sounder	$117.00	$207.00	36.0	36.0
Coaster	$120.00	$165.00	30.0	30.0
MBTA	$84.50	$363.00	37.6	29.0
NJ Transit Rail	$60.00	$480.00	26.7	28.7
South Shore Line	$110.75	$373.75	36.9	28.2
VRE	$88.70	$318.10	26.9	27.5
Caltrain	$84.80	$349.80	26.5	26.5
Metrolink	$56.00	$441.00	32.0	26.3
Metra	$107.00	$278.00	28.5	25.9
ACE	$88.00	$364.00	20.7	25.1
MARC Train	$135.00	$324.00	27.0	24.9
SEPTA Regional Rail	$101.00	$191.00	26.9	21.2
MTA Metro-North Railroad	$180.00	$536.00	22.5	20.4

System	Base Monthly	Max Monthly	Base Monthly Multiplier	Max Monthly Multiplier
UTA FrontRunner	$198.00	$198.00	79.2	20.4
MTA Long Island Rail Road	$190.00	$500.00	21.7	17.1
Amtrak - Capitol Corridor	$98.00	$656.00	16.3	15.3
Tri-Rail	$100.00	$100.00	40.0	14.5

Source: Agency websites, May 2017.

Multi-Trip Passes

In addition to monthly passes, many systems offer multi-trip tickets in booklets of 8-12. Table 24 shows the prices for multi-trip tickets on each of the systems that offers them. It also includes the number of trips included, and the calculated discount compared to purchasing single fares (at both the base and maximum fares). Caltrain offers a slightly below average discount on multi-trip tickets of 7 percent, ranking 6th out of 8 systems.

Table 24: Multi-Trip Passes

System	Base	Max	# of Trips	Discount at Base Price	Discount at Max Price
Tri-Rail	$21.25	$57.50	12	29%	31%
SEPTA Regional Rail	$38.00	$80.00	10	20%	11%
VRE	$29.40	$105.60	10	11%	9%
Metra	$33.75	$96.75	10	10%	10%
Denver RTD	$23.50	$40.50	10	10%	10%
Caltrain	$23.70	$97.70	8	7%	7%
South Shore Line	$33.25	$126.00	10	5%	5%
NJ Transit Rail	$30.00	$171.50	10	0%	5%

Source: Agency websites, May 2017.

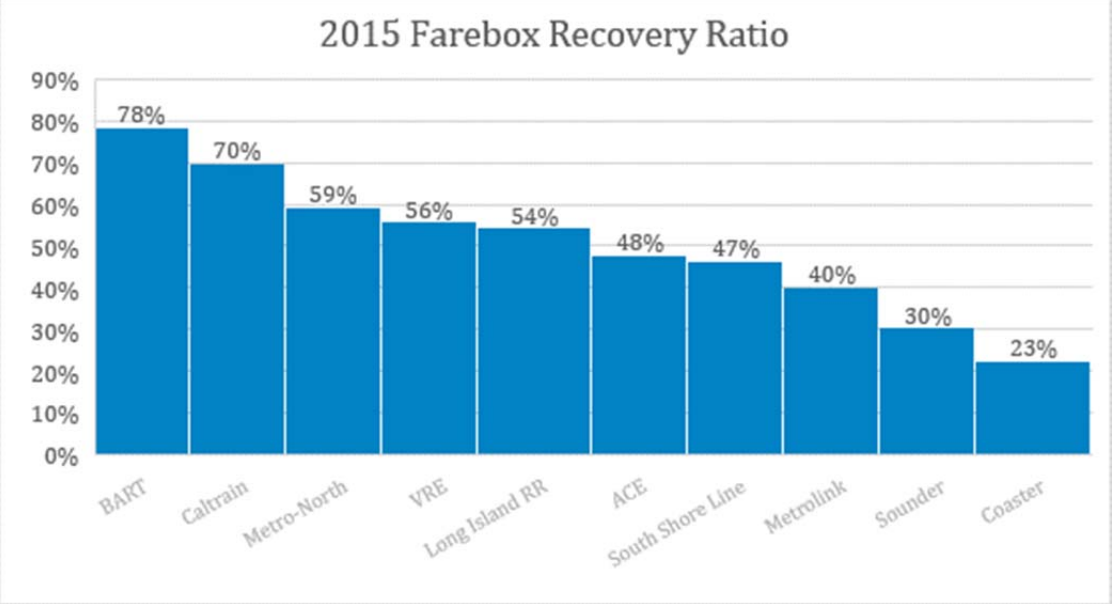
Farebox Recovery

An agency's farebox recovery ratio is the percentage of its total operating budget that is recouped through fares. All transit agencies must report details about revenue and operating expenses to the Federal Transit Administration (FTA) to be recorded in the National Transit Database (NTD). The NTD is public, so it is possible to calculate a farebox recovery ratio for nearly every transit provider in the U.S.

Some of Caltrain's peer commuter rail systems are operated by large transit agencies that also operate light rail and/or bus systems. Comparing Caltrain's farebox recovery ratio to those agencies does not make sense, as they are not providing a comparable suite of services (and allocation of revenue to commuter rail can be difficult on systems with combined fares). However, several of the large commuter rail systems, Caltrain included, are operated independently. Figure 13 shows 2015 (the most recent year for which data are available) farebox recovery ratios for only those transit providers that

exclusively operate commuter rail systems. Among these, Caltrain has the highest farebox recovery ratio at 70 percent. For reference, BART is included, and has an even higher ratio of 78 percent.

Figure 13: Farebox Recovery Ratios



Source: National Transit Database, 2017.

Peak and Off-Peak Pricing

During Caltrain's peak commuting hours, some trains are very crowded, and peak period pricing is one possible way to alleviate some of that crowding. This section presents information on several U.S. and international commuter rail systems that price tickets differently depending on the time of travel, as part of an effort to quantify the level of discount/surcharge. Again, further information is available in Appendix A.

Only four transit systems in the U.S. use peak pricing. Additionally, three systems from outside the U.S. were studied, from Chile, Australia, and the UK. Discounts for off-peak trips relative to peak trips are shown in Table 25. The discount is shown at both the minimum and maximum fare for each system, and a clear trend is that longer, more expensive trips tend to receive a higher off-peak discount.

Off-peak discounts range from 11 percent for short trips on the WMATA system to 45 percent for long trips on Australia's Adelaide Metro. Most off-peak discounts are between 20 and 35 percent.

In one case (Metrotren of Santiago, Chile), there are three fare levels for low, medium, and high ridership periods. This analysis reflects the periods with the highest and lowest fares.

Table 25: Peak and Off-Peak Pricing

System	Location	Off-peak discount at Minimum fare	Off-peak discount at maximum fare
Adelaide Metro	Adelaide, Australia	23%	45%
London Overground	London, UK	0%	33%
Long Island Rail Road	NYC	24%	27%
Metro-North Railroad	NYC	25%	26%
Metrotren	Santiago, Chile	17%	32%
SEPTA	Philadelphia	21%	23%
WMATA	Washington DC	11%	36%

Source: Agency websites, May 2017.

Employer Programs

Many transit agencies offer "deep discount" programs to large groups of likely users, such as employees of a certain company or faculty, staff, and students of a college or university. In interviews, most transit agencies cited attracting riders as the reason for implementing these programs, and they are often created in response to flagging ridership.

Utah Transit Authority (UTA) and Metrolink both operate commuter rail systems and offer a bulk purchase pass for employers (both are called Eco-pass). Just as with Caltrain's Go Pass program, companies must purchase the pass for all employees. However, pricing for these programs is variable (which is consistent with how such programs are described generally in TCRP Report 94), and the pricing model is not public. Interested companies must request a quote from the agency. Pricing is based on the nature of the organization and the amount the passholders are expected to use the service. This could be a sensible approach for Caltrain's Go Pass, since the true value of Go Pass varies widely depending on the company or organization.

Outside of the realm of commuter rail, many agencies offer similar annual pass programs. Pricing can be based on zones, or in some cases, directly on the system use for the particular company buying the passes, as determined by a survey. While the administrative burden would be high, this could be a viable option for Go Pass, as Caltrain already administers such a survey.

Deep discount programs are generally seen as detrimental to agency revenue. Pre-tax transit benefit vouchers (like TransitChek®), which in many cases can be automated to fill an employee's farecard every month, are preferred by some transit agencies (and employers). By purchasing Clipper Card fare with such vouchers, Caltrain customers can already use this type of benefit.

Means-Tested Discounts and Subsidies

Some transit agencies provide means-tested subsidies to low-income riders. TriMet, in the Portland, Oregon area, offers subsidized fares to nonprofit organizations, who in turn provide fare to their low-

income clients. Their website states: "We set aside a total of $1.5 million for these programs to mitigate impacts of fare increases on low-income riders. Through these programs, we provide fares to non-profits and community-based organizations at a lower cost or at no cost, which they then distribute to their low-income clients."[8]

Metro, in Los Angeles, offers a $10 subsidy on monthly passes, which is awarded based on the income of the rider. Low-income riders receive coupons that can be used to purchase fare media directly from local transit providers (e.g., Long Beach Transit, Culver City Bus Lines). The coupons are distributed through two nonprofit organizations, each of which provides the coupons for a certain geographic area.[9] Figure 14 shows Metro's income requirements for the program.

San Francisco Municipal Transportation Agency (SFMTA) and King County Metro Transit in Washington State use a slightly different approach. Both agencies administer means-tested fare discounts themselves. However, both agencies also rely on other organizations to do the actual means testing. In the case of SFMTA, it is the Human Services Agency of San Francisco, a municipal agency. For King County, several external organizations to the transit agency, including a mix of nonprofit and government organizations, provide the verification services.

A major benefit of all of these approaches is that it allows the external organizations to do the means-testing, thereby offloading a major administrative burden for the transit agency. In fact, no transit agency appears to offer a direct, means-tested fare discount for low-income users. A discount based on eligibility for other means-tested programs (such as the Supplemental Nutrition Assistance Program or SNAP) may be feasible, which might make the program easier to administer.

Figure 14: Income Requirements for Metro's Rider Relief Program

Annual Income	Persons in Household
$30,400 or below	1
$34,750 or below	2
$39,100 or below	3
$43,400 or below	4
$46,900 or below	5
$50,350 or below	6

4.3 Agency Profiles

Interviews were conducted with six commuter rail providers about when and how they change their fare structure. It was clear that some commuter rail providers have a very mature protocol on fare setting, while others are more ad hoc. That said, all providers were very thoughtful about their fare

[8] https://trimet.org/accesstransit/

[9] https://www.metro.net/projects/rider_relief/rider-relief-overview/.

setting processes. Some agencies are considering changing how they set fares within the next few years, while others seem to have found a formula that works and are sticking with it for the foreseeable future.

There is a clear consensus for some fare-setting practices. With respect to equity, most agencies find that federal Title VI requirements are stringent enough to be adequate as a policy that ensures fare equity, and do not make any additional considerations. Additionally, a large majority of the staff interviewed to recommended changes in fare that were frequent (every 1-2 years) and small. Most cited negative public reactions to larger fare increases, which customers tend to regard as sudden and unfair. They also cited the fact that slow and steady increases tend to stabilize an agency's finances generally, making them more consistent and credible and less prone to wild fare swings.

Peak period fares are only employed by the largest agencies, as most systems don't report enough crowding to necessitate it. The people interviewed generally viewed peak period pricing as making things more complicated for riders. Discount programs, meanwhile, tend to be viewed as good for ridership but bad for revenue.

Several agencies reported an approximate fare elasticity, which ranged from -0.13 to -0.22. This is consistent with research on commuter rail systems compiled in the TCRP Traveler Response to Transportation System Changes Handbook, for which elasticities were reported to range from -0.09 to -0.22. Several interviewees mentioned that elasticities tend to be lowest for peak period ridership and highest for off-peak.

As a general rule, these agencies view their farebox revenue as covering a share of their operating budget, with capital funds coming from other sources.

Summaries of each of the six interviews with transit agency staff are presented below.

Metra

Metra is a commuter rail line in the Chicago metropolitan area. Metra's representative was clear that they find Title VI requirements easy to comply with, and that equity considerations were not a major part of Metra's fare policy process. That said, he was concerned that simply raising fares equally for all customers over time, which is legitimate under Title VI requirements, creates a ridership pool that ultimately caters to "suits" while pricing other demographics off the system. He questioned whether that serves the agency's mission. (Others at NJ TRANSIT had similar concerns.) As an equity consideration, Metra provides options for paying with cash for unbanked customers.

Metra has a farebox recovery goal of 52 percent. Revenues in excess of that can be used for capital or operational improvements.

Metra is considering peak period pricing. Slightly over half of Metra ridership is peak hour, peak direction. A few pilot programs were done in the 1980's, but no permanent policy changes were made. A related idea that Metra is considering is a CBD surcharge. This is intended to encourage riders who

are traveling on trips where there is available capacity (non-CBD trips), while charging more to customers who are on the most congested part of the system (trips to the CBD).

Elasticity of demand for Metra ridership is estimated at -0.22. For some lines, especially those with limited or negative population growth, elasticity may be higher.

Metra is generally considering changes to their fare structure, and is currently conducting a fare study with a consultant. Among other things, Metra is considering university passes, but fear a major loss of revenue (the marketing department is more interested in pursuing this option than the planning department).

Metro-North Railroad

Serving the New York metropolitan area, Metro-North Railroad (MNR) fare prices (including discount, weekly, monthly, and ten-trip tickets) are derived from the one-way peak fare through multipliers. In other words, all fares change by the same percentage at the same time.

Like most providers, MNR prefers to make frequent, small increases to the fare to cover rising costs. This practice was learned over time when they used to have more ad hoc increases that created some chaos among customers and politicians alike. MNR representatives emphasized that frequent changes (currently every two years) depoliticize the process, as it is expected and normal and therefore not in the political realm. Fare changes are scheduled in accordance with an overall five-year financial plan, so they are generally scheduled five years ahead of time.

MNR uses peak period pricing, which they say is chiefly a measure to reduce crowding. However, peak fares are also thought of as a way to incentivize the purchase of time-based (monthly and weekly) tickets. The MNR representatives interviewed believe that time-based tickets lead to less fare evasion and less effort on the part of conductors.

Each fare increase requires an opportunity for public input, though this rarely leads to any changes.

Utah Transit Authority (UTA) FrontRunner

As a relatively new system, the Utah Transit Authority (UTA) is more focused on ridership than revenue, though they expect budget considerations to become more important moving forward. They are also eager to keep the system as approachable as possible. They plan to stick with zone-based fares, because they find that the terrain of the Salt Lake City area makes zone-based fares intuitive. They have not seriously considered peak/off-peak fares, because they regard them as confusing to riders and they do not currently have capacity issues.

Overall, UTA has a farebox recovery goal of 20 percent, but this is just one of several goals and is not always met. They offer many pass programs, including an educational pass for four major universities, and a yearly pass for businesses called Eco Pass. Much like Go Pass, Eco Pass must be provided to every employee. It is only offered to business with over 35 employees or more, and the price varies depending

on the number of employees and the level of transit service offered. UTA views both programs as good sources of ridership but bad for revenue. The UTA representatives suspect that because these programs serve the whole of the agency, and not just FrontRunnner, it would be politically difficult to discontinue them.

With respect to fare elasticities, UTA assumes an elasticity of about -0.13 for commuter rail and light rail riders, which is based on a regression model using empirical data.

Metrolink

Metrolink is a commuter rail system that serves Southern California. In general, Metrolink raises fares on an as-needed basis, when revenue projections fall short of budgetary goals. They don't plan very far ahead – usually, the board initiates changes to fare policy and changes are enacted shortly thereafter. (This is similar to Coaster.)

In recent years, Metrolink's goal has been to optimize ridership, prioritizing riders over revenue. Recently, Metrolink restructured their fares to be based on station-to-station distance, making short trips relatively affordable. They also found that this fare structure decreased fare evasion compared to other fare pilot projects. For example, they tried a flat fare of $3 per station passed on your trip. However, some stations have long distances between them, and some don't, so people gamed the system and evaded by staying on longer than their ticket allowed. The system is proof-of-payment, so fare evasion is greater concern compared to commuter rail inspection schemes (i.e. conductor inspections, which validate nearly all tickets).

Metrolink is not actively considering peak period pricing; peak period trains are not overcrowded, and enforcement could be difficult or costly.

Based on a study of ticket sales data, Metrolink assumes an average overall price elasticity of demand of -0.21 (though this estimate varies by market segment). The agency has an on-call consultant who does regular research relating to fares.

With respect to public outreach, Metrolink often conducts pilot pricing changes and do not engage the public beforehand. For permanent changes, there is some public outreach.

NJ Transit Rail

NJ Transit is a commuter rail system that serves New Jersey. The conversation with a representative from NJ Transit centered on peak and off/peak fares. NJ Transit is unique in that they used to charge a peak fare, but no longer do. The representative told a story in which then-executive director George D. Warrington received a phone call from an official at the U.S. Treasury Department, who was on a very crowded (and discounted) off-peak (weekend) train, asking why the agency offered an off-peak fare (and thus were losing revenue). The agency did away with the off-peak discount shortly thereafter. Long story short: peak and off-peak fares can be revenue positive, neutral, or negative…

The representative also cited Title VI as a complication in instituting differential peak/off-peak pricing. It was difficult to demonstrate that peak-period pricing did not differentially affect low-income populations.

Finally, it was mentioned that using peak/off peak fares causes confusion among customers. On a conductor-based inspection, it can mean significant numbers of people bought the wrong ticket and therefore need to pay more. The representative reported that it takes conductors at least 10 times longer than the time to check a ticket with the peak/off peak fares. This then increases fare evasion as conductors get bogged down in cash transactions and cannot inspect (and punch) other customers' tickets, which means the tickets can be reused and any peak revenue gains could be offset.

Coaster Commuter Rail (NCTD)

Coaster Commuter Rail serves the San Diego metropolitan area. The ultimate responsibility for setting Coaster's fares falls to the San Diego Association of Governments (SANDAG), the regional MPO. However, considerable discretion is given to individual transit agencies. Fare studies are frequent and conducted by SANDAG with modeling help from outside consultants.

Coaster also receives operational funding from California's Transportation Development Act (TDA). The funds they receive are, in part, a function of farebox recovery ratio, and Coaster's budgeting is built around this ratio. That said, fares tend to be set ad hoc based on budget needs, once they are allocated revenue from TDA and other sources. When they have to cut service or raise fares to meet that budget, then a fare increase is considered.

The last fare increase was 2008-2009 in response to an expected revenue shortfall. Fares were increased in stages over two years, and it's possible that technique could be used again. They raised fares at that time based on a fare study's recommendations; the fare study was conducted to help advise the fare increase. SANDAG is currently conducting a new fare study for Coaster in anticipation of a July 2018 fare increase.

Coaster had a 4 zone structure, but after some recent ridership declines it was changed to a 3 zone structure and fares were lowered, particularly for short trips. The system continues to struggle to attract enough riders, and the SANDAG representative believes low gas prices are one important reason for the lower ridership.

Coaster and SANDAG are generally not interested in peak period pricing, since capacity is not an issue and stakeholders view the scheme as complicated. For public outreach, they follow what was described as the typical Title VI scenario. Specifically, they will go out to the public with alternatives, then the preferred alternative will be selected at a public board meeting.

4.4 Lessons for Caltrain

Caltrain's approach to fares is in line with those of most of its peer agencies. Increasing fares every two years seems to be an industry-wide best practice, and many agencies also conduct fare studies before changing fares. Large fare increases are more likely to encounter public resistance than frequent, small increases. Additionally, regular changes to fares that are expected by the public make fare policy less politically fraught, because if changes are expected, political candidates are unlikely to campaign on opposition to them.

Caltrain has considerably lower total ridership than most of the agencies who employ peak period pricing (or have in the past), and most agencies of similar size are not particularly interested. If Caltrain were to institute peak period pricing, it would be the smallest system to do so. Additionally, New Jersey Transit's experience with conductors spending large amounts of time collecting money for incorrect tickets (i.e. off-peak tickets during peak periods) suggests a formidable challenge for Caltrain, which also operates on a proof-of-payment system.

With respect to means-testing for means-based fares, transit agencies seem to be ill-equipped to implement these programs on their own. Instead, agencies who have successfully implemented means-based discounts have done so by partnering with nonprofit organizations or government agencies to do the means testing.

5 Goals and Performance Metrics

This chapter presents the draft goals and performance metrics for the Caltrain Fare Study. While these goals and performance metrics have been shared with and discussed by the Joint Powers Board, they have not been adopted as formal policy for the agency. The intent is to uses these goals and performance metrics to assess the performance of potential changes to Caltrain's fares, as presented in the Caltrain Fare Elasticity chapter, though they could also be referenced in the future as part of developing and adopting a formal fare policy for the agency.

5.1 Goals and Performance Metrics

To address the primary objectives for the Caltrain Fare Study, as stated in the Purpose and Need, a set of performance goals and metrics have been developed and are presented in the table below. Goals identify key areas of achievement and desired outcomes from Caltrain's Fare Study. Metrics provide specific measures to support achievement of a goal and track progress towards goals. The metrics below can be used to assess how the different fare scenarios compare with one another and help achieve (or not) the goals for Caltrain's fares. The metrics can primarily be estimated with the results of the Fare Elasticity Model and can be tracked in the future if Caltrain continues to collect data as it does now.

Table 26: Goals and Performance Metrics for Caltrain's Fares

Goal	Performance Metric
Enhance ridership	Average weekday ridership
	Total annual ridership
Increase operating revenue	Total annual revenue
	Total annual revenue per passenger
Safeguard social and geographic equity	Percentage of low income riders projected vs. percentage of low income riders in counties[1]
	Caltrain's average fare per track mile vs. other transit agencies' average fare per track mile[2]

Notes:
1. The U.S. Census Bureau provides data on annual household income in the 2012-2016 American Community Survey 5-Year Estimates. Results for households with an annual household income less than $30,000 include 22% of San Francisco County households; 13% of San Mateo County households; and 15% of Santa Clara County households.
2. See Appendix A for other transit agencies' average fare per track mile.

6 Caltrain Fare Elasticity

6.1 Introduction

When the previous Caltrain Fare Study was conducted back in 2001, the results indicated that Caltrain's ridership demand was elastic, or highly influenced by price, and any fare increase was expected to generate a significant ridership decline. Since 2001, however, on-board surveys of Caltrain customers have revealed that many riders along the corridor have high relative incomes and may not be as price sensitive as riders during the early 2000s. Indeed, the agency has gradually increased its fares over the last decade, and Caltrain ridership has continued to steadily climb, signaling that demand may be less elastic today. In this context, one critical objective for the Caltrain Fare Study in Phase 1 was to determine the price elasticity of demand for Caltrain's current ridership. Another key objective was to develop a modeling tool for the agency to use to test and analyze potential fare changes to regular fare products.

This chapter presents the summaries of that work. First, this chapter provides an overview of the approach for determining the current price elasticity of demand for Caltrain's ridership. It then describes the ridership survey that was conducted and how the results of this survey were used to determine the current price elasticity of demand of the current ridership and build the Fare Elasticity Simulator. Additionally, examples of the Fare Elasticity Simulator results are presented, using potential fare change scenarios that were developed by Caltrain staff with Board input. The chapter ends with some of the key lessons learned about the current ridership elasticity and implications for potential future fare changes.

Caltrain Fare Elasticity Highlights

- Using data from an extensive rider survey, a Fare Elasticity Simulator was built for Caltrain. This tool can be used to test potential fare changes to existing, regular fare products and to analyze potential ridership, revenue, and equity outcomes.
- Riders' demand for Caltrain was found to be inelastic, meaning that current passengers are not expected to drastically change their demand for Caltrain service based on fare changes. The price elasticity for the overall system was estimated to be -0.2.
- Raising fares should lead to an increase in revenue for the agency, with minor ridership declines among existing riders and very slight declines for social and geographic equity indicators.
- Caltrain's higher income riders were found to have more elastic demand, or be more "price sensitive," than lower income passengers.
- This means that increased Caltrain fare prices are most likely to be absorbed by passengers with the least means to pay for higher fares.
- These findings point to important policy questions: just because Caltrain *can* raise fares without losing much of its ridership, does that mean it *should*? How much revenue should Caltrain generate from its riders? And from which fare products?

6.2 Background on Approach

In general, it is difficult to determine price elasticities based only on historical data because ridership is typically affected by a number of factors, and it is difficult statistically to reliably isolate the effects of fare changes alone. TRB's most recent edition of the comprehensive guidebook, *Traveler Response to Transportation System Changes,* which has one of the most complete compilations of data on transit fare elasticities, lists only three estimates of commuter rail price elasticities, all from studies conducted in the 1980s and 1990s and all for traditional East Coast services that had very different

(and much lower) fares than Caltrain. Because price elasticities generally increase as prices increase, an estimate based only on current fares would not accurately represent changes in ridership at higher fares. As a result of these limitations, the vast majority of work on transit price elasticities in the past decade has used an alternative survey-based approach that was originally developed to support pricing research for consumer products.

This approach, alternatively called "choice-based conjoint (CBC)," "stated choice," or "stated preference," involves a survey that presents users with several scenarios in which prices and other service characteristics are varied. It then asks them how their use of the service would change under each of those scenarios. The scenarios are constructed using a statistical design that allows the effects of price and other attributes to be estimated. Those estimates can then be used in a spreadsheet model application tool to estimate fare elasticities for each key user group under different policy scenarios. The model application tool can also be used to model potential price scenarios and effects. This stated preference approach is widely used to estimate price elasticities both for transportation services and for a wide range of other consumer products and services, and it was the approach used to determine the current price elasticity of demand and develop a modeling tool to test fare price changes for Caltrain.

6.3 Caltrain Fare Study Rider Survey

The first step to determining the current price elasticity for Caltrain riders was to develop and administer the Caltrain Fare Study Rider Survey. The survey presented an opportunity to learn more about passengers' sensitivity to changes in price, as well as passengers' sensitivity to travel in the peak and off-peak hours. This section presents the survey design, administration, and results.

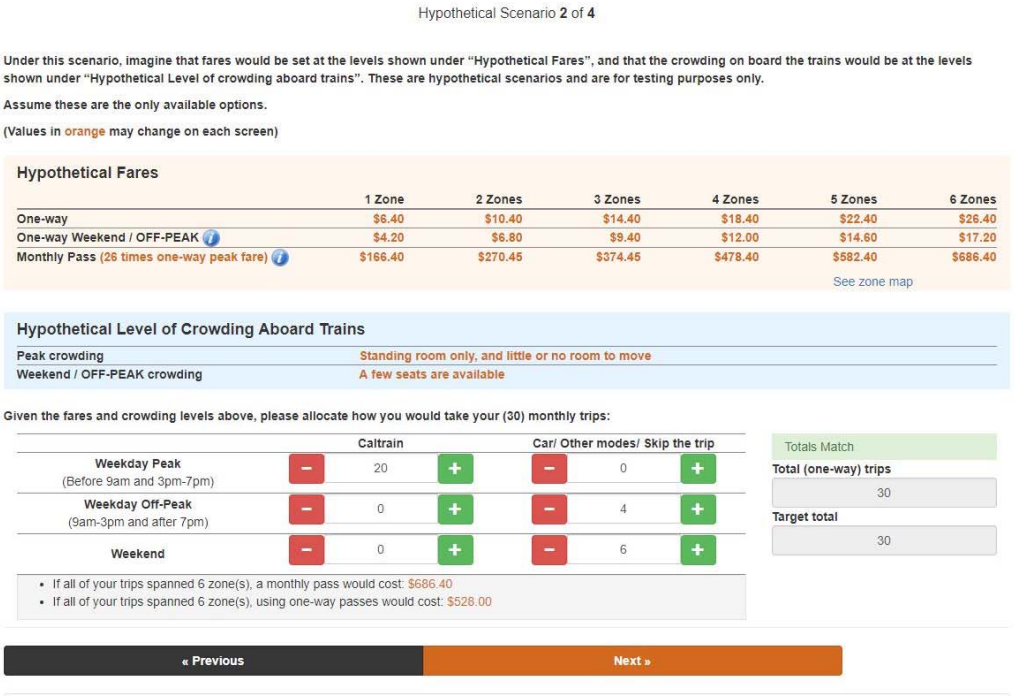
Rider Survey Design

Stated preference questions were developed for Caltrain to learn about passengers' typical travel behavior and about how they might react in different scenarios relating to fare structure and crowding. Depending on whether they were a frequent rider (using Caltrain at least once per month) or infrequent rider (using Caltrain less than once per month), survey respondents saw one of two types of questions.

Frequent Riders

Frequent riders were asked to consider how their choices for a full month might differ under different conditions. Variables included the cost of a peak period ticket, the cost of an off-peak period ticket, the cost of a monthly ticket, and levels of crowding during peak and off-peak periods. Respondents were asked to allocate each of their monthly trips (they were asked how many total trips they took along the corridor in a month) to one of three groups: peak, off-peak, or another (non-Caltrain) mode. Subsequently, respondents were asked whether, under the given conditions, they would purchase a monthly pass. Figure 15 shows an example experiment.

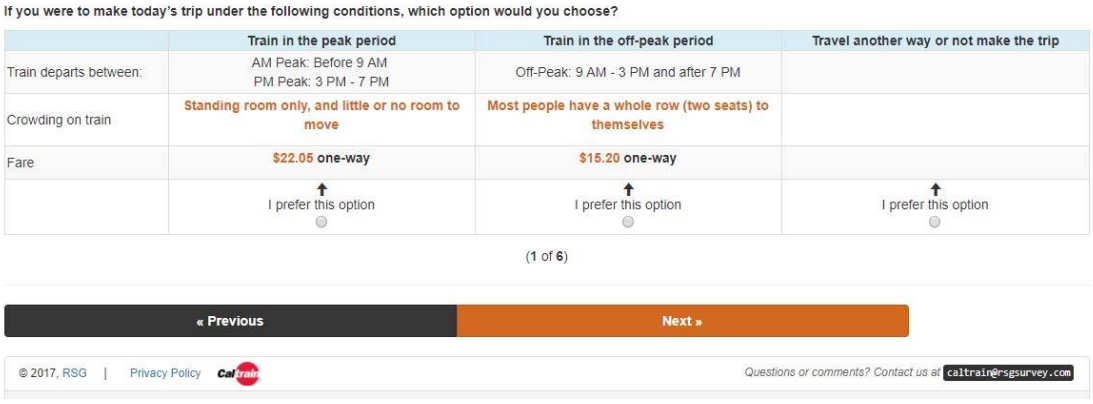
Figure 15: Frequent Rider Stated Preference Experiment



Infrequent Riders

Infrequent riders were asked questions of a different nature. Instead of asking them to consider a whole month's worth of trips, they were asked how their trip today might have differed under different conditions. Each respondent answered six questions about how they would have traveled with different levels of fares and crowding in the peak and off-peak periods. They could choose between a peak period trip, an off-peak period trip, and choosing another travel mode altogether. Figure 16 shows an example experiment.

Figure 16: Infrequent Rider Stated Preference Experiment



Survey Administration

Caltrain customers were recruited to participate in the survey aboard select trains and through an email invitation. It was anticipated that the two recruitment efforts would yield a combined 1,200 to

2,000 completed surveys, with a goal of at least 1,600 completed surveys. Through both recruitment methods, a total of 3,135 complete survey records were collected – well above the goal.

Over the course of eight days, beginning the evening of Monday, September 4, 2017 through the morning of Monday, September 11, 2017, 6,655 Caltrain customers were approached and invited to participate in the survey while riding the train, using tablet computers. Respondents who were unable to complete the survey before alighting the train were sent a link to begin the survey again online, starting from where they left off (assuming they provided an email address). The on-board efforts recruited 2,353 respondents who completed the survey for a response rate of 35 percent.

After the conclusion of the field campaign, 4,814 invitations to participate in the study were emailed to Caltrain customers. The email lists were provided by Caltrain and included customers who opted-in to the study through Caltrain's website. The opt-in form was available to customers on Caltrain's website for over two weeks, September 5, 2017 through September 22, 2017, and in total, 175 customers opted-in to the survey. Ultimately, 782 customers recruited through an email invitation completed the survey for a response rate of 16 percent.

Survey Results

The stated preference survey data regarding riders' trip choices from the Fare Study Rider Survey provided a wealth of quantitative data that was then used to build the Caltrain Fare Elasticity Simulator, as described below.

6.4 Fare Elasticity Simulator

With the Caltrain Fare Study Rider Survey complete, it was possible to develop the Fare Elasticity Simulator, which is described in this section. The Fare Elasticity Simulator is a tool that can be used by Caltrain staff to estimate changes in Caltrain ridership and revenue based on hypothetical changes to pricing to regular fare products and levels of crowding on the trains.[10]

Developing the Fare Elasticity Simulator

As noted above, there were two surveys administered for frequent and infrequent riders. Based on the two sets of survey data from these two rider groups, two separate models for rider behavior were developed. These two models explain the travel choices observed in the rider survey data. Specifically, each explains the relationships between a passenger's estimated use of Caltrain and several different variables, including fare price, level of crowding on board the train, and time of travel.

Once the two models were estimated, they were combined into one application so that a single set of inputs could be used to predict revenue and ridership on the Caltrain system. The output from the individual models was weighted and calibrated to be reflective of real-world conditions on the Caltrain system in a base case of September 2017 fares. This involved, for instance, calibrating the models to predict the correct number of monthly pass purchases at September 2017 fare and

[10] Go Pass is not included in the Fare Elasticity Model, as it is not a regular fare product. All Fare Elasticity Model Results exclude ridership and revenue generated through Go Pass.

crowding levels. Together, the models predict how Caltrain riders' travel choices might change under hypothetical changes to fare pricing and crowding. Based on these predictions, the models can statistically generate a possible range of ridership and revenue forecasts that range from low to high estimates.

The final step to complete the Caltrain Fare Elasticity Simulator was to develop a user-friendly interface to allow for selection of model inputs and viewing of a summary of model results that could be easily interpreted. Through this interface, an analyst can select model inputs related to the price of existing, regular fare products and levels of crowding on board the trains. Then, after running the model, the Fare Elasticity Simulator generates results in an easy-to-read format, showing the estimated revenue and ridership data that result from the model inputs.

When looking at revenue projections, it is prudent and advised to look at the lower end of the possible results so that it is more likely that revenue forecasts are not over-estimated. To that end, two versions of the Fare Elasticity Simulator were produced, with one displaying the typical, median estimate of forecasted results and the other displaying the low estimate of forecasted results. These two sets of results provide a range of possible results for the agency, but again, it is advised that the conservative results be especially considered when looking at revenue projections.

Ultimately, the Fare Elasticity Simulator is an important tool that allows Caltrain to estimate how ridership and revenue could change with potential changes to fare pricing for existing, regular fare products and levels of crowding on the train. Using the Fare Elasticity Simulator results, it is possible for the agency to evaluate potential changes for ridership, revenue, and equity impacts.

6.5 Price Elasticity of Demand of Caltrain Ridership

Using the Fare Elasticity Simulator that was developed with the rider survey data, it was possible to determine that current rider demand for Caltrain service is inelastic. This finding means that in general, Caltrain riders are relatively insensitive to price, and increasing fare prices should lead to an increase in fare revenue for the agency without significantly impacting ridership. This section first describes the modeling results regarding price elasticity and then places those findings in a broader context for the agency.

Price Elasticity Results

As discussed earlier in the chapter, the amount of change in demand for a good or service generally depends on how much the price changes for that good or service. Price elasticities generally increase as prices increase: a small price change may result in a small change in demand, resulting in a low elasticity value, while a large price change may result in a large change in demand, resulting in a high elasticity value. Using the Caltrain Fare Elasticity Simulator, it was possible to estimate the change in Caltrain ridership that would result from various fare changes and the estimated price elasticity values at these various price points.

Table 27 shows the range of estimated price elasticity for Caltrain system overall. Specifically, it shows the estimated ridership change for each 10 percent fare increase up to 100 percent, as well as the resulting price elasticity value. Results are shown for both the middle and low estimates in the

possible range of results, to provide an understanding of possible range of riders' price elasticity for Caltrain. These values form the "elasticity curve," which is illustrated graphically in Figure 17.

The results from the middle of the range indicate that for every 10 percent increase in fares, the agency may expect about a 1 percent decrease in ridership, or a price elasticity value of -0.1. The model suggests that a doubling of fares (i.e. a 100 percent increase) would correspond to a 12 percent loss in ridership, or -0.12 for a price elasticity value, under the middle of the range results.

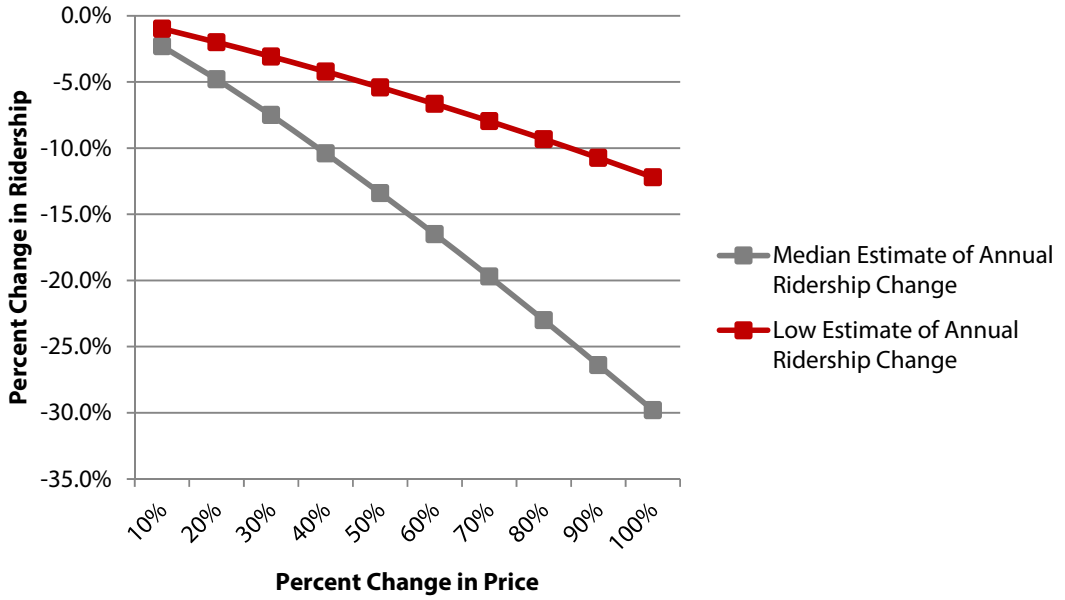
Looking at the conservative results from the low end of the estimated range, the model suggests that a 10 percent increase in fares would result in a loss of 2.3 percent of Caltrain riders, resulting in a price elasticity value of -0.23. A doubling of fares (i.e. a 100 percent increase) was estimated to correspond to 30 percent loss in ridership under the conservative results.

Table 27: Range of Estimated Price Elasticity for Caltrain System Overall

Percent Change in Fares	Range of Estimated Percent Change in Annual Ridership	Range of Estimated Price Elasticity Value
10%	-1.0% to -2.3%	-0.10 to -0.23
20%	-2.0% to -4.8%	-0.10 to -0.24
30%	-3.1% to -7.5%	-0.10 to -0.25
40%	-4.2% to -10.4%	-0.11 to -0.26
50%	-5.4% to -13.4%	-0.11 to -0.27
60%	-6.7% to -16.5%	-0.11 to -0.28
70%	-8.0% to -19.7%	-0.11 to -0.28
80%	- 9.3% to -23.0%	-0.12 to -0.29
90%	-10.7% to -26.4%	-0.12 to -0.29
100%	-12.2% to -29.8%	-0.12 to -0.30

Notes:
1. For the range of results, the first value corresponds to the results from the middle of the possible range, while the second value corresponds to the results from the low end of the possible range. Thus, the first value is a higher estimate and the second value a more conservative estimate.
2. Model results are estimates only.
Source: Caltrain Fare Elasticity Simulator, 2017.

Figure 17: Estimated Range of Caltrain Price Elasticity



Source: Caltrain Fare Elasticity Simulator, 2017.

Differences in Price Elasticity between Lower Income and Higher Income Riders

Table 28 shows the estimated price elasticity of demand by Caltrain riders' annual household income, based on the conservative results from the low end of the model estimates. In accordance with Caltrain's current Title VI protocol, an annual household income under $30,000 was considered low income in the Fare Elasticity Model. All other riders with an annual household income over $30,000 were considered higher income riders in the Fare Elasticity Model. Generally, the results show that higher-income riders appear to be slightly more elastic, or sensitive to price increases, than low income riders. For example, a 50 percent increase in fares is estimated to correspond to about a 12.3 percent loss of low income riders, compared to a 13.5 percent decrease in higher income riders. As fares increase, however, the price sensitivity of higher income riders accelerates. With a doubling of fares (a 100 percent increase in fares), it is estimated that low-income ridership would decrease by 24.6 percent and higher-income ridership would decrease by 30.3 percent.

While it may seem counterintuitive that low income riders are less price sensitive than higher income riders, this finding is consistent with trends observed in other transit systems, especially commuter rail lines.[11] It is generally explained by differences in demand between transit user types: transit-dependent riders are less price sensitive to price changes because they do not have many other transportation alternatives, while discretionary or "choice" transit riders are more price sensitive because they have other transportation alternatives available. As a result, demand from

[11] See, for example, "Transit Price Elasticities and Cross Elasticities" by Todd Litman, Victoria Transport Policy Institute, February 27, 2017.

transit-dependent riders is less elastic than choice transit riders. In general in the United States, transit-dependent riders are often from lower income households.

There are additional possible explanations for this phenomenon on the Caltrain system. It may be that other transportation alternatives are less feasible and/or more expensive than Caltrain for riders from low income households, so their demand for Caltrain is more inelastic. Riders from low income households may be less likely to own a sufficient number of vehicles to meet their household's potential driver need, which means that they may be without access to a car.[12] Even if low-income riders have access to a car, they may not have access to employer-provided free parking, making driving a more expensive alternative. Additionally, Caltrain riders generally travel long distances on the corridor; covering the same trip with other transit services may not be feasible for low income passengers, and the trip cost may be prohibitive with taxis or transportation network companies (such as Lyft or Uber). Ultimately, these lower income riders are more likely to be dependent on Caltrain as their best transportation option, so they have less elastic demand and are likely to have higher tolerance for price increases.

This finding has important equity implications for Caltrain, because those passengers with the least means to pay for Caltrain are more likely to continue to ride the system through price changes and to absorb higher fares, while those who are more likely to have the means to pay for higher fares are more likely to leave Caltrain for other transportation options when prices are increased.

Table 28: Estimated Price Elasticity for Caltrain System Overall, by Rider Income Group

Percent Fare Change	Estimated Percent Annual Ridership Change for Annual Household Income Less than $30,000	Estimated Elasticity	Estimated Percent Annual Ridership Change for Annual Household Income More than $30,000	Estimated Elasticity
10%	-2.4%	-0.24	-2.3%	-0.23
20%	-4.8%	-0.24	-4.8%	-0.24
30%	-7.3%	-0.24	-7.5%	-0.25
40%	-9.8%	-0.25	-10.4%	-0.26
50%	-12.3%	-0.25	-13.5%	-0.27
60%	-14.8%	-0.25	-16.6%	-0.28
70%	-17.3%	-0.25	-19.9%	-0.28
80%	-19.8%	-0.25	-23.3%	-0.29
90%	-22.2%	-0.25	-26.8%	-0.30
100%	-24.6%	-0.25	-30.3%	-0.30

Source: Caltrain Fare Elasticity Simulator, 2017.

Riders' Overall Price Elasticity for Caltrain

It is important to note that the modeling results are *estimates* that are derived from a model of traveler behavior based on survey data. While the Fare Elasticity Simulator results indicate that rider demand is quite inelastic, it is important to note that this understanding is derived from a model

[12] According to the 2016 Triennial Survey, 40 percent of Caltrain passengers surveyed did not have access to a car for their trip. For individuals surveyed with an annual household income of $30,000 or less, 71 percent did not have access to a car for their trip.

that is just that – a model that is fallible and is built on survey data, not real-world data. For that reason, it is recommended that when considering the price elasticity of demand for the Caltrain system overall, it be understood as a possible range of values from -0.1 to -0.3, with a reasonable estimate for the elasticity value for the system overall to be around -0.2.

The Fare Elasticity Simulator considers the effects that variables such as Caltrain fare pricing and level of crowding could have on riders' travel behavior. In addition to those variables, however, there are many other variables that can and do affect riders' demand for Caltrain that are not explicitly accounted for in the Fare Elasticity Simulator; examples include the availability of other transportation choices, the level of traffic congestion on roadways, and the travel times and cost of Caltrain relative to other travel modes. Understanding the price elasticity of demand for Caltrain as a range of values also acknowledges that these other variables can affect Caltrain riders' travel choices and their demand for Caltrain.

Ultimately, even the high end of this estimated elasticity range of -0.1 to -0.3 indicates that rider demand for Caltrain is inelastic (as any elasticity value between 0 and -1.0 means that raising fares will increase revenue by some amount). Confirmed by the modeling results, the key finding for Caltrain is that increasing fare prices will most likely result in increased fare revenue, even though ridership declines are forecasted due to the price increases. It is important to note that in Caltrain's case, since demand for the rail service is still growing, it is possible for ridership to increase after a fare increase, but it is likely that some existing riders will reduce their Caltrain travel due to the increased price.

6.6 Testing of Scenarios of Potential Fare Changes

Using the Fare Elasticity Simulator, scenarios of potential changes to existing, regular fare products can be tested and analyzed for ridership, revenue, and equity impacts by Caltrain staff. It is anticipated that this tool will be used to help analyze potential future fare changes for Caltrain. It is likely that it will also be used to help inform development of future fare policy, by understanding how the "pulling" of various fare "levers" affects the agency and its goals related to ridership, revenue, and equity.

This section presents an example selection of scenarios that were tested using the Fare Elasticity Simulator and a summary of their results at the conservative end of range of results. They are intended to demonstrate the capabilities of this modeling tool and how they can be used to assess achievement towards the goals for Caltrain's fares. These results can also help the agency start thinking about potential fare policy and how various fare changes could help achieve different aims.

It is important to note that these scenarios and results are *examples only*. They are analyzed here as part of the Fare Study, and they are not being proposed as potential fare changes for the agency to implement at this time. Instead, they are intended to illustrate how the agency can use the Fare Elasticity Simulator and analyze potential fare changes for their forecasted effects on ridership, revenue, and equity.

Scenarios of Potential Fare Changes

Informed by feedback from the Caltrain Board of Directors, the scenarios of potential fare changes[13] presented include the following fare changes:

- **Scenario 1 – Increasing the base fare by 25 cents**: $4.00 for a regular base fare; $2.00 for a regular base fare with Eligible Discount; $3.40 for the Clipper Card base fare; and $1.70 for the Clipper Card base fare with Eligible Discount.
- **Scenario 2 – Increasing the zone fare by 25 cents**: $2.50 for each zone upgrade; $1.25 for each zone upgrade for Eligible Discount.
- **Scenario 3 – Reducing the Clipper Card discount (Five percent off the base fare, instead of the current discount of 15 percent off the base fare):** $3.55 for the Clipper Card base fare; and $1.70 for the Clipper Card base fare with Eligible Discount.
- **Scenario 4 – Removing the Clipper Card discount (No discount, instead of the current discount of 15 percent off the base fare):** $3.75 for a regular base fare; $1.75 for a regular base fare with Eligible Discount (No Clipper fares).
- **Scenario 5 – Introducing a 25 percent discount off the base fare for off-peak travel (including weekends)**: $2.80 for a regular base fare during off-peak; $1.40 for a regular base fare during off-peak with Eligible Discount; $2.40 for the Clipper Card base fare during off-peak; $1.20 for the Clipper Card base fare during off-peak with Eligible Discount.

Results of Scenario Testing

The results from testing the scenarios using the Fare Elasticity Simulator enable the agency to compare the model outputs to some of the key goals and metrics for Caltrain's fares from Phase 1 of the Fare Study (presented earlier in the report).

Table 29 shows a summary of the modeling results for each of the five scenarios of potential fare changes to regular fare products, including key indicators for ridership, revenue, and equity. The modeling results shown are the conservative estimates from the low end of the possible range of results. Go Pass revenue and ridership is excluded.

- **Ridership:** For all of the scenarios presented here, a very slight decrease in ridership is expected compared to the baseline. It is important to note that the magnitude of the ridership decrease is very small, and ridership losses are not expected to be substantial across all of the scenarios. With regards to specific scenario results, the highest ridership results are estimated to be highest under the Scenario 5 – Introducing Off-Peak Base Fare Discount, while they are estimated to be lowest under Scenario 4 – Removing the Clipper Card Discount. With regards to Scenario 5 – Introducing Off-Peak Base Fare Discount, ridership increased in the off-peak period, but the peak period did not see a large decrease

[13] Scenario descriptions only show fares that were changed; all other fares were set to October 2017 fare prices.

in ridership, suggesting that the off-peak discount will not be as effective at relieving capacity issues during the peak period under the current service schedule.

- **Revenue:** Despite the forecasted very slight declines in ridership, each scenario generates positive revenue returns for the agency; in fact, most of the scenarios generate *substantial* increases in revenue. Annual revenue and average annual revenue per passenger are estimated to be the highest on Scenario 2 – Increasing Zone Upgrade Fare and Scenario 4 – Removing the Clipper Card Discount. Unsurprisingly, revenue returns are lowest for Scenario 5 – Introducing Off-Peak Base Fare Discount, which presents a relatively small increase from the baseline revenue.

- **Equity:** Similar to ridership, the scenarios generally produce very small declines in social and geographic equity measures. Compared to the baseline, all of the scenarios but one are estimated to result in very slight declines for the social equity indicators compared to the baseline. Under Scenario 5 – Introducing Off-Peak Base Fare Discount, however, lower income ridership grows, resulting in equity gains compared to the baseline. Geographic equity, as indicated by the maximum fare per track mile for each scenario, is about the same for all the scenarios, but is slightly more for Scenario 2 – Increasing Zone Upgrade Fare.

Table 29: Ridership, Revenue, and Equity Results from Scenarios of Potential Fare Changes to Regular Fare Products

Goals Related to Fares	Enhance Ridership				Increase Operating Revenue			Safeguard Social and Geographic Equity			
Scenario	Estimated Total Annual Ridership	Estimated Percent Change in Total Annual Ridership	Estimated Average Weekday Ridership	Estimated Percent Change in Average Weekday Ridership	Estimated Total Annual Revenue	Estimated Percent Change in Total Annual Revenue	Estimated Average Annual Total Revenue Per Passenger	Percentage of Total Ridership - Estimated Share of Low Income Riders[1]	Estimated Percent Change in Total Annual Low Income Ridership	Estimated Maximum Fare Per Track Mile[2]	Key Takeaways from Scenario Results
Base (September 2017)	14.8m	n/a	52,300	n/a	$75.1m	n/a	$5.08	8.86%	n/a	$0.17	n/a
1. Change Oct. 2017 Fares to Increase Base Fare by 25 Cents	14.3m	-3.08%	50,700	-3.27%	$80.0m	7.22%	$5.59	8.98%	-1.77%	$0.20	Major revenue benefits; modest ridership loss; minor equity losses
2. Change Oct. 2017 Fares to Increase Zone Upgrade Fare by 25 Cents	14.2m	-4.19%	50,100	-4.44%	$81.4m	9.17%	$5.75	9.00%	-2.73%	$0.21	Major revenue benefits; some ridership losses; some equity losses
3. Change Oct. 2017 Fares to Reduce Clipper Fare to 5% Discount	14.3m	-3.50%	50,400	-3.80%	$80.3m	7.70%	$5.64	8.98%	-1.90%	$0.20	Major revenue benefits; modest ridership loss; minor equity losses
4. Change Oct. 2017 Fares to Remove Clipper Card Discount	14.2m	-4.20%	50,100	-4.50%	$81.4m	9.00%	$5.75	9.01%	-2.50%	$0.20	Major revenue gains; some ridership losses; some equity losses
5. Change Oct. 2017 Fares to Off Peak Discount of 25% Off Base	14.5m	-1.94%	51,200	-2.30%	$76.3m	2.31%	$5.27	9.08%	0.45%	$0.20	Minor revenue gains; minor ridership losses; minor equity benefits

Notes:
1. The U.S. Census Bureau provides data on annual household income in the 2012-2016 American Community Survey 5-Year Estimates. Results for households with an annual household income less than $30,000 include 22% of San Francisco County households; 13% of San Mateo County households; and 15% of Santa Clara County households.
2. See Appendix A for average fare per track mile for other agencies.
3. Scenarios are examples only and are not proposed as fare changes for implementation at this time. Results shown are the conservative results from the Fare Elasticity Simulator, rather than the middle of the range. Excludes Go Pass ridership and revenue. Results are rounded to nearest hundred thousand; nearest hundred; or nearest percent. Results are estimates only; they are based on a model of behavior derived from rider survey data.
Source: Caltrain Fare Elasticity Simulator, 2017.

6.7 Conclusion

Understanding Effects of Potential Fare Changes

The agency now has a valuable tool, the Fare Elasticity Simulator, to test potential fare changes on existing, regular fare products and analyze ridership, revenue, and equity returns. This tool will be available for Caltrain staff to use for assessing potential fare changes and informing budgeting processes now and in the future.

Scenarios of potential fare changes were tested for the Fare Study to analyze impacts to goals related to ridership, revenue, and equity. In general, the scenario testing results confirm that Caltrain passengers' demand is currently inelastic, so increased fares are expected to result in increased fare revenue for Caltrain. All of the scenarios tested showed positive results for revenue impacts. At the same time, increasing fares is expected to generally have very small but negative impacts to the ridership and equity indicators.

Ridership is strongest under the lowest fare prices tested, and it gradually decreases the more fares are increased; however, the ridership losses are not expected to be substantial because demand is so inelastic, even under the highest fares tested. Lower income ridership is best served with lower fares and off-peak discounts; benefits for lower income riders are not as substantial with the Clipper Card discount, as that is a fare product that is less likely to be used by lower income riders. Related to social equity, fare increases are estimated to result in greater numbers of higher income riders leaving Caltrain than lower income riders, because lower income riders have more inelastic demand and are more willing to absorb higher fares than other Caltrain riders. Geographic equity measures are best served with lower fares, and fare increases generally decrease performance outcomes. Fare changes that result in larger proportional charges for longer travel distances, such as increasing the zone upgrade fare, have more negative effects on ridership but better returns on revenue.

Policy Considerations

Important policy questions arise out of these results. The Fare Elasticity Simulator shows that Caltrain can raise its prices to gain substantial revenue returns without losing large portions of its current ridership; thus, it could be easy to conclude that the agency could help solve its fiscal difficulties by maximizing its fare prices and increasing total annual farebox revenue. As a public transportation provider without a permanent dedicated source of funding, this could be a viable option for Caltrain, especially in the face of potential budget deficits. At the same time, Caltrain provides a critical transportation service for the public in three counties in the Bay Area, so the agency must consider the current ridership's inelastic demand for Caltrain service from another angle: how much revenue *should* Caltrain generate from the riding public? Is it fair to continue increasing Caltrain fares at a time when many current passengers are willing to pay higher fares? What are the broader implications, for the agency and for the public, of fare increases? How can the agency balance tradeoffs between the three Fare Study goals of increasing revenue, enhancing ridership, and safeguarding social and geographic equity?

Related to this, the findings in the Existing Conditions research showed that discrepancies in the fare product usage patterns among different rider income groups. Caltrain's lower income riders are more likely to use fare products that are priced the highest and earn the most revenue per passenger and per passenger mile for the agency. At the same time, the Fare Elasticity Simulator results showed that these same lower income riders have low demand inelasticity, meaning that they are more likely to absorb price increases so they can continue riding Caltrain. This raises concerns related to the Fare Study's goal of safeguarding social equity[14], and it leads to another policy question: how much revenue the agency should be generating for its fares, *and from which fares*?

[14] Title VI of the Civil Rights Act of 1964 prohibits discrimination on the basis of race, color, and national origin in programs and activities receiving federal financial assistance. The JPB has committed to the Federal Transit Administration (FTA) Title VI objectives set forth in Circular 4702.1B ensuring that FTA-assisted benefits and related services are made available and are equitably distributed without regard to race, color, or national origin. For any proposed fare increases, Caltrain has conducted and will continue to conduct a highly technical Title VI Equity Analysis that conforms to federal law.

7 Recommendations and Next Steps

This chapter presents the key recommendations to come out of Phase 1 of the Fare Study, as well as recommended next steps for Phase 2 of the Fare Study.

7.1 Recommendations from Phase 1 of the Fare Study

The culmination of findings from the extensive research and analysis from Phase 1 is presented below in five key recommendations for the agency.

- **Balance Goals Related to Revenue, Ridership, and Equity.** The goals for Caltrain's fares that were developed through the Fare Study include enhancing ridership, increasing revenue, and safeguarding social and geographic equity. The findings from Phase 1 of the Fare Study illuminate the challenge and difficulty of achieving all three of those goals simultaneously. In addition, Phase 1 results indicated that Caltrain's current ridership has low price elasticity of demand for the commuter rail service, but this result should not be taken as a "blank check" for future fare increases. In other words, just because the agency *can* increase fares does not mean it *should* do so. Instead, the agency should thoughtfully consider and weigh the broader picture of revenue, ridership, and equity impacts and tradeoffs of potential fare changes before adopting and implementing them, striving to balance gains towards all three of the goals.

Key Recommendations Highlights

- The agency should consider the broader goals of revenue, ridership, and equity gains and weigh tradeoffs and possible impacts of potential fare changes before adopting and implementing them.
- The agency should develop a formal fare policy to be adopted by the Caltrain Board of Directors to guide price-related decision making. This policy will help the agency balance the competing goals of increasing revenue, enhancing ridership, and safeguarding social and geographic equity.
- The agency should consider opportunities to address the current equity issue in the agency's fare system, including pricing strategies and potential participation in the regional means-based fare program.
- The Fare Elasticity Simulator should be used to analyze tradeoffs when the agency is considering changes to its existing, regular fare products.
- An off-peak fare discount is not recommended for implementation at this time.

- **Adopt a Formal Foundational Fare Policy.** The findings from Phase 1 of the Fare Study make it clear that the agency would benefit from a Board-adopted fare policy that would establish principles and goals that would underlie and guide the agency's pricing-related decisions. The policy would allow the agency to prioritize the relative importance of the goals from the Fare Study, including enhancing ridership, increasing revenue, and safeguarding social and geographic equity; this would aid staff and the Board by guiding decision-making regarding potential fare changes. The policy could also evaluate and guide the process for changing fares, potentially including the frequency of fare increases (changing fares every two years was a

popular interval with peer agencies). The peer comparison report found that several peer agencies strongly endorse frequent, planned, and predictable fare changes for a number of reasons, including improving the agency's budgeting and planning, reducing pressure on the Board, and helping manage fare expectations with the public.

- **Seek Opportunities to Address Current Fare Equity Questions.** Another key finding from Phase 1 of the Fare Study is that there is currently a question about equity in the agency's fare system and product use patterns, and it is recommended that the JPB consider opportunities to address this. Caltrain's lower income passengers generally use fare products that cost the passenger more per ride and earn the agency more revenue per passenger and per passenger mile when compared to products that are used by Caltrain's higher income passengers. Additionally, lower income passengers generally have more inelastic demand for Caltrain and are more likely to continue riding the train in spite of fare increases, while higher income passengers have less inelastic demand and are more likely to stop riding Caltrain if fares increase.

    - Potential options to address the current inequity in the fare system include changing the pricing of current products to ensure that products that are more likely to be used by higher income riders contribute more revenue to the farebox. For instance, the Clipper discount and Caltrain's deep discount program, Go Pass, are two products that are more likely to be used by higher income passengers but currently contribute lower revenue per passenger and per passenger mile, compared to other Caltrain fare products.

    - Another option to consider is potential participation in the regional means-based fare program that is currently being discussed and developed by the Metropolitan Transportation Commission (the region's metropolitan planning organization, known as MTC) and regional transit operators. This program would provide a transit fare discount to qualified low income individuals at participating transit agencies. At this time, Caltrain could not undertake such a program on its own, without the support of a central regional program, so while program discussions are ongoing and many details have yet to be worked out, it is recommended that Caltrain staff continue to participate in the regional conversations about the means-based program. The agency stands to gain many equity benefits by participating, as it could help make Caltrain more affordable for lower income passengers. It is also recommended that the agency continue assessing the financial and administrative implications of program participation to be sure that the equity benefits of participation would not be outweighed by potential financial and administrative costs.

- **Use Fare Elasticity Simulator to Analyze Potential Fare Changes.** The Fare Elasticity Simulator provides the agency with an important tool to help analyze impacts of potential fare

changes. It is recommended that the agency use the Fare Elasticity Simulator when considering potential future fare changes to existing, regular fare products, so that it can be better informed regarding potential impacts to ridership, revenue, and equity. In particular, because Caltrain's current ridership demand is inelastic, the raising of fare prices is expected to generally lead to an increase in fare revenue for the agency. At the same time, increased fares are also expected to have some negative ridership and equity impacts; in general, these are not forecasted to be large but nonetheless should be considered as potential adverse impacts. Incorporating the use of the Fare Elasticity Simulator into the agency's process for considering potential fare changes can help the agency weigh tradeoffs and potential impacts, ultimately leading to more informed decision-making regarding fare changes.

- **Delay Implementation of Off-Peak Fare Discount.** While there are some low income ridership gains to be expected from an off-peak fare discount, it is recommended that the agency not pursue this sort of discount at this time. Offering an off-peak discount may increase off-peak trips on the Caltrain system, especially among lower income passengers, but it is expected to do relatively little to reduce peak period trips and alleviate current capacity issues on board during the peak period. An off-peak discount is expected to currently result in lower revenue earnings, an implication that should be carefully considered, as well. Once the agency has implemented a service schedule that includes more off-peak train service, it is recommended to consider an off-peak fare discount.

7.2 Recommended Next Steps

Near-term Next Steps

Building on the key recommendations discussed above, the following tasks are proposed for Caltrain to pursue in the near term.

Recommended Next Steps Highlights

- Conduct Phase 2 of the Fare Study and include: 1) development of a formal fare policy for the Joint Powers Board; 2) additional Go Pass program analysis; and 3) a parking pricing study.
- Continue participating in the development of the regional means-based fare program with MTC and other transit operators. Consider formally participating in the program if that is an option, while weighing the costs and benefits to Caltrain of participation.
- Coordinate with the Caltrain Business Plan process and address longer-term fare issues in the context of that planning effort and its findings.

1. **Conduct Phase 2 of the Fare Study, to include the tasks described below.**

    a. **Develop and adopt a formal fare policy for Caltrain to establish the principles, goals, and procedures that will underlie and guide the agency's pricing-related decisions.** This task should include research into how other agencies set or change fare policy. Then, building on those best practices, a draft policy should be crafted and eventually adopted by the Caltrain Board of Directors. This policy should establish goals and principles for Caltrain's fares, and given the challenges of simultaneously balancing ridership, revenue, and equity benefits through fare changes,

it is advised that the policy consider *prioritizing* goals and objectives relative to one another. The policy should also consider establishing protocols regarding the frequency of fare increases for the agency and procedures for enacting fare increases. It should also consider whether the agency would benefit by including a multi-year plan for Caltrain's fares in the policy, and if so, include it in the policy.

b. **Conduct a detailed study of Caltrain's deep discount program, Go Pass, to inform potential changes to the program in the near future.** While Phase 1 included some initial findings related to Go Pass, including some of the benefits it provides for the agency, the program has not been comprehensively studied since it began. Additional study and analysis is needed to inform the agency's understanding of the program and to assess potential changes to the program. The Go Pass Study should seek to understand how other transit agencies structure, price, and administer their deep discount programs, especially those with variable pricing. Additionally, this task should include analysis of the value of Go Pass to the agency, including its administrative cost relative to other fare products; it should also study the value of Go Pass to participating entities and to Peninsula communities (especially with regards to local Transportation Demand Management requirements). Building on the recommended task above, the Go Pass Study should consider potential changes to the program to ensure that it aligns with the goals and principles established in the formal fare policy. Recommendations should be developed with potential changes to the program (or not), which could relate to program pricing, requirements for participating entities, or broader structural considerations.

c. **Conduct a Parking Study to inform potential changes to Caltrain's parking program in the near future.** Similar to the Go Pass program, Phase 1 of the Fare Study presented some initial findings related to the agency's parking program, a broader study of its parking program is needed. It is recommended that this task explore parking strategies and scenarios for Caltrain's parking program. This should include consideration of demand-based parking strategies for transit agencies, including variable pricing by station or by fare type (day pass vs. monthly pass, etc.). Recommendations related to price setting and enforcement should be included as well. Lastly, the Parking Study should be informed by other planning studies that are underway and related to station planning, including the Station Management Toolbox.

2. **Continue participating in development of the regional means-based fare program with MTC and other transit operators.** It is strongly recommended that the agency continue to consider participating in the potential regional means-based fare program, as discussions continue between MTC and transit operators regarding the program's development. JPB staff should continue to participate in these conversations, while also analyzing trade-offs for

Caltrain's potential participating, including financial, administrative, and equity considerations. Staff should return to the Caltrain Board of Directors with additional information when the program is further along in development to discuss the agency's potential participation. If the Board agrees to participate in the program, the discount fare program must be formally adopted and implemented as a fare change to Caltrain's fare system, including Title VI analysis and public outreach processes.

Longer-term Next Steps

A long-term, comprehensive plan for Caltrain is currently under development with the Caltrain Business Plan initiative, and other planning studies are being coordinated with the scope of that effort. It is recommended that several longer-term issues related to fare policy be advanced within the context of the Caltrain Business Plan. This includes studying Caltrain's current zone-based fare structure in contrast to a station-to-station structure; innovative fare products and pricing, such as the off-peak discount; integration with regional and statewide ticketing innovations; and technological improvements to fares (advanced mobile ticketing, integrated ticketing with parking and access programs, etc.). These are farther-reaching policy considerations that must be aligned with the scope and outcomes of the Caltrain Business Plan, so at this time, it is recommended that the agency defer these items to a later time.

CALTRAIN FARE STUDY

Phase 1 Report - Appendices

Public Review Draft

AUGUST 2, 2018

Appendix A

Table A1: Peer Agency Fare Comparison

Table A2: Peak Pricing Analysis

Table A1: Peer Agency Fare Comparison (May 2017)

			Max fare per track mile		One-way cash fare		Monthly pass		Monthly Pass Multiplier		Multi-trip pass			Multi-trip discount	
System	Track miles	Zones	Cash	Monthly Pass	Base	Max	Base	Max	Base	Max	Base	Max	# of trips	Base	Max
ACE	86.0	6	$0.17	$0.10	$4.25	$14.50	$88.00	$364.00	20.7	25.1	-	-	-	-	-
Amtrak - Capitol Corridor	168.0	n/a	$0.26	$0.09	$6.00	$43.00	$98.00	$656.00	16.3	15.3	-	-	-	-	-
BART Average	40	n/a	$0.16	-	$1.85	$6.19	-	-	-	-	-	-	-	-	-
Caltrain[1]	76.6	6	$0.17	$0.11	$3.20	$13.20	$84.80	$349.80	26.5	26.5	$23.70	$97.70	8	7%	7%
Coaster	41.1	3	$0.13	$0.10	$4.00	$5.50	$120.00	$165.00	30.0	30.0	-	-	-	-	-
Denver RTD[2]	23.0	3	-	-	$2.60	$4.50	$99.00	$171.00	38.1	38.0	$23.50	$40.50	10	10%	10%
MARC Train Average	63.3	n/a	$0.17	$0.11	$5.00	$11.00	$135.00	$305.67	27.0	27.7	-	-	-	-	-
MBTA Average[3]	33.1	8	$0.38	$0.28	$2.25	$10.42	$84.50	$330.88	37.6	31.8	-	-	-	-	-
Metra Average	45.6	8	$0.19	$0.13	$3.75	$8.66	$107.00	$246.84	28.5	28.5	$33.75	$96.75	10	10%	10%
Metrolink Average	73.1	n/a	$0.20	$0.14	$2.39	$14.36	$69.00	$415.96	29.1	29.2	-	-	-	-	-
MTA Long Island Rail Road[4]	120.0	8	$0.24	$0.10	$8.75	$29.25	$190.00	$500.00	21.7	17.1	-	-	-	-	-
MTA Metro-North Railroad[5]	81.2	11.0	$0.30	$0.15	$8.92	$23.83	$199.67	$501.33	22.4	21.1	-	-	-	-	-
NJ Transit Rail[6]	48.1	11.1	$0.32	$0.22	$3.61	$14.83	$103.67	$417.67	28.3	28.1	$30.00	$171.50	10	0%	5%
SEPTA Regional Rail[7]	21.4	3.0	$0.37	$0.23	$ 3.75	$6.37	$101.00	$167.31	26.9	27.0	$38.00	$80.00	10	20%	11%
Sounder Average	41.5	n/a	$0.13	$0.11	$3.25	$5.38	$117.00	$193.50	36.0	36.0	-	-	-	-	-
South Shore Line[8]	90.0	8	$0.15	$0.10	$3.50	$13.25	$110.75	$373.75	31.6	28.2	$33.25	$126.00	10	5%	5%
Tri-Rail	70.9	6	$0.10	$0.03	$ 2.50	$ 6.90	$100.00	$100.00	40.0	14.5	$21.25	$57.50	12	29%	31%
UTA FrontRunner[9]	88.0	n/a	$0.11	$0.05	$ 2.50	$ 9.70	$198.00	$198.00	79.2	20.4	-	-	-	-	-
VRE Average	45.0	8	$0.24	$ 0.16	$ 3.30	$10.53	$88.70	$289.45	26.9	27.5	$29.40	$105.60	10	11%	9%

			Max fare per track mile		One-way cash fare		Monthly pass		Monthly Pass Multiplier		Multi-trip pass			Multi-trip discount	
System	Track miles	Zones	Cash	Monthly Pass	Base	Max	Base	Max	Base	Max	Base	Max	# of trips	Base	Max
Notes: 1. Min/max price based on Clipper fare. 2. Information for individual lines not available. Max price for airport trips excluded (only one-way airport travelers would ever need to pay this fare). 3. A 10-ride pass is only available on mobile app and offers no discount. 4. Peak fares shown. Ten trip pass offers no discounts for peak and a consistent 15% for off peak. 5. Peak fares shown. 6. Atlantic City line omitted. 7. Advanced (off-train) sales assumed. Center City to University City, Glenside Combined, and Fern Rock to Center City routes omitted. 8. There is also a 25-trip ticket with a 10% discount. 9. Monthly pass is a single price and includes other modes. Source: Agency websites, 2017.															

Table A2: Peak Pricing Analysis (May 2017)

System	Location	Type	Annual Ridership (approx)	Min Peak	Min off-peak	Max peak	Max off-peak	Off-peak discount Min	Off-peak discount Max
Adelaide Metro	Adelaide, Australia	Commuter Rail	13,000,000	$3.54	$1.94	$3.54	$1.94	45%	45%
London Overground[1]	London, UK	Commuter Rail	184,000,000	£6.60	£6.60	£28.60	£19.30	0%	33%
Long Island Rail Road	NYC	Commuter Rail	103,000,000	$8.25	$6.25	$29.25	$21.25	24%	27%
Metro-North Railroad[2]	NYC	Commuter Rail	86,000,000	$8.00	$6.00	$26.26	$19.50	25%	26%
Metrotren[3]	Santiago, Chile	Commuter Rail	5,000,000	$890	$740	$2,200	$1,500	17%	32%
SEPTA[4]	Philadelphia	Commuter Rail	36,000,000	$4.75	$3.75	$6.50	$5.00	21%	23%
WMATA	Washington DC	Urban Rail	261,000,000	$2.25	$2.00	$6.00	$3.85	11%	36%

Notes:
1. Prices in Pounds sterling.
2. Prices are for Hudson Line but are representative of peak/off-peak ratios on the system.
3. Prices in Chilean pesos. Metrotren has three fares for high, medium, and low periods. These fares represent high and low.
4. "Peak" fares are actually weekday fares, off-peak are evenings/weekends.


Caltrain